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The After-Chroming of Wool

The Results of an Investigation to Determine the Influence of the Nature of the Negative Ion on the Mordanting Process—Present Scope Limited to the After-Chroming Process

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IN mordanting with compounds of chromium, the bichromate of soda is the salt which is by far the most widely used. This is true whether the mordanting takes place before or after dyeing. Since bichromate of soda is the source of most of the other chromium salts, in all probability it will continue to find the widest employment. There are occasions, however, when it is desirable to use for mordanting a salt of chromium in which the chromium is present in the form of a base—i. e., as the positive ion as distinguished from compounds like the bichromates, where the chromium is present as an acid, or negative, ion.

Present Uses of Chromium Salts

At the present time the use of the salts of chromium—and for the purpose of clarity it may be here stated that the term "salt of chromium" will be understood to mean a salt where the chromium is positive—is confined principally to the after-chroming process or for wool printing, both Vigoureux and fabric. For wool printing it is essential to use a chromium salt instead of a bichromate, as so powerful an oxidizing agent as a bichromate is incompatible with the organic thickening agents in the printing paste. Further, in the high concentration necessary it would destroy most of the colors. In after-chroming, chromium salts are used where the bichromates seriously throw the shade. There are not a great many colors where such is the case; in fact, in many dyehouses no salt except a bichromate is ever used. In other dyehouses, however, chromium fluoride, chromium acetate or chromium sulphate is used when occasion requires.

It is also entirely possible that preliminary mordanting may eventually be done with a salt of chromium. In chrome tanning, which in many ways is analogous to chrome mordanting, the whole modern tendency is toward the use of a chromium salt.

Purpose and Scope of Investigation

In view of the present occasional use, therefore, of chromium salts, and possible greater prospective use, it has seemed desirable to conduct an investigation to determine if in a chromium salt the nature of the negative ion has any influence on the mordanting process.

So far this investigation has been limited to the after-chroming process.

The salts of chromium which have been investigated are:

Chromium acetate
Chromium chloride
Chromium fluoride
Chromium nitrate
Chromium oxalate
Chromium sulphate

These salts were used in quantities which were equivalent to each other, and further, for purposes of comparison tests, were made with an equivalent amount of bichromate.

The colors selected for the tests were of types considered as representative, and are as follows:

Alizarine Yellow 2GO
Acid Anthracene Red 3B
Chloramine (Diamine) Fast Red F
Carmoisine Conc.
Acid Anthracene Brown FW
Acid Alizarine Blue SKY
Acid Violet 6RN
Acid Alizarine Green CG Extra

With some of these colors—e. g., Carmoisine, Brown FW and Violet 6RN—the oxidizing action of bichromate is apparently essential to develop the shade.

The tests were made on 10-gram skeins of worsted yarn. The after-chroming was done in the same bath in which the dyeing took place. The percentages of chromium salt taken were the quantities which the particular samples of salts used were equivalent to the percentage of bichromate; in most cases the percentage does not correspond to the chemically pure chromium salt.

After the skeins were dyed, the fastness to scouring was tested by the following method: A standard portion of each skein was braided with white woolen cotton and silk yarn. These braided skeins were steeped for sixteen hours in a solution containing 5 grams of neutral soap and 2 grams soda ash per liter, then this solution raised to 140 deg. Fahr. and the skeins rubbed on a board until felted.

Alizarine Yellow 2GO

The results obtained are as follows: Alizarine Yellow 2GO. This is a very pure, highly concentrated form of the well-known dyestuff obtained from meta-nitro-aniline and salicylic acid.

Dyeing Recipe

1. Two per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid; boil one-half hour, rinse and dry. This will be termed the "acid" dye.
2. Same, except at the end of one-half hour 1 per cent of bichromate of soda was added. This will be termed the "bichromate" mordant.
3. Same, except 3 per cent of chromium acetate was used in place of the bichromate.
4. Same, with 1.7 per cent chromium chloride.
5. Same, with 2 per cent chromium fluoride.
6. Same, with 3¼ per cent chromium nitrate.
7. Same, with 3¾ per cent chromium oxalate.
8. Same, with 4 per cent chromium sulphate.

1. *Acid Dyeing.*—The acid dye gave a clear deep lemon-yellow shade; when scoured, a large portion of the color was removed; the white wool and silk considerably stained; the cotton unstained.

2. *Bichromate.*—With bichromate the shade is made much browner. Scouring test: Shade holds original depth; wool, cotton and silk unstained.

3. *Chromium Acetate.*—With chromium acetate the shade is considerably deeper than the acid dyeing, but not materially changed. Scouring test: Shade holds original depth; wool and silk slightly stained; cotton unstained.

4. *Chromium Chloride.*—With chromium chloride the shade is slightly browner than with chromium acetate, but much less changed from the acid dyeing than with the bichromate.

5. *Chromium Fluoride.*—With chromium fluoride the shade is slightly browner than with the chloride, but very much nearer that of the bichromate. Scouring test: Original shade not altered; wool and silk very slightly, if at all, stained; cotton unstained. Resistance practically as good as with bichromate.

6. *Chromium Nitrate.*—With chromium nitrate the shade is almost identical with that of chromium fluoride. Scouring test: Shade is altered; but wool and silk very slightly—but perceptibly—stained.

7. *Chromium Oxalate.*—With chromium oxalate the shade the same as with the fluoride and nitrate. Scouring test similar, although a trifle better than nitrate.

8. *Chromium Sulphate.*—With chromium sulphate the shade is very close to that with the chloride; less brownish and not so deep as with the fluoride, nitrate and oxalate. Scouring test: Most nearly like the chloride, better than with the acetate, but not quite so good as with the fluoride, as the wool and silk are slightly stained.

Acid Anthracene Red 3B

Dyeing Recipe

1. Three per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid; boil one-half hour longer; rinse and dry.
2. Same, with the addition of 1½ per cent bichromate of soda.
3, 4, 5, 6, 7, 8. Follow same order of mordants as with Alizarine Yellow.

1. *Acid Dyeing.*—Acid dyeing, full bright red shade. Scouring test: Silk considerably, cotton slightly, stained; wool unstained.

2. *Bichromate.*—With bichromate the shade is slightly dulled and somewhat bluer. Scouring test only slightly, if at all, better than acid dyeing.

3. *Chromium Acetate.*—With chromium acetate the shade is duller and weaker than the acid dyeing, noticeably weaker than with bichromate. Scouring test: Same as acid dyeing.

4. *Chromium Chloride.*—With chromium chloride the shade is brighter than with the bichromate or acetate. Scouring test: Same as acid dyeing.

5. *Chromium Fluoride.*—With chromium fluoride the shade is similar to that with chloride; brighter than with bichromate. Scouring test: Same as others; slightly, if at all, better than acid dyeing.

6. *Chromium Nitrate.*—With chromium nitrate the shade is similar to the preceding. Scouring test, likewise same.

7. *Chromium Oxalate.*—With chromium oxalate the shade is slightly bluer than preceding, more nearly like the acetate. Scouring test as others.

Chloramine (Diamine) Fast Red F

Dyeing Recipe

Same as with Acid Anthracene Red 3B, using 3 per cent color. With bichromate, 1½ per cent was used, and equivalent proportions of other salts.

1. *Acid Dyeing.*—Acid dyeing, full brick-red shade. Scouring test: White wool unstained; cotton considerably and silk slightly stained.

2. *Bichromate.*—With bichromate the shade is very decidedly browned and dulled. Scouring test: Wool and silk unstained; cotton very slightly stained.

3. *Chromium Acetate.*—With chromium acetate the shade is only very slightly browner and duller than is the acid dyeing. Scouring test: Wool and silk unstained; cotton badly stained.

4. *Chromium Chloride.*—With chromium chloride the shade is similar to preceding, but a little bluer and fuller. Scouring test: White wool unstained; silk slightly and cotton considerably stained.

5. *Chromium Fluoride.*—With chromium fluoride the shade is practically as bright and a little deeper than acid dyeing. Scouring test: White wool and silk unstained; cotton slightly stained.

6. *Chromium Nitrate.*—With chromium nitrate, shade nearly as brown as with the bichromate. Scouring test: Same as preceding; cotton, if anything, less stained.

7. *Chromium Oxalate.*—With chromium oxalate, shade similar to that with chloride. Scouring test: Rather poor; silk slightly, cotton heavily, stained.

8. *Chromium Sulphate.*—With chromium sulphate, shade similar to oxalate, but slightly weaker. Scouring test: Similar to chloride.

Carmoisine Conc.

Dyeing Recipe

1. Three per cent color, 10 per cent Glauber salt, 10 per cent sulphuric acid; boil one-half hour and add 3 per cent sulphuric acid.
2. Same as above, with the addition of 1½ per cent bichromate of soda.

3, 4, 5, 6, 7, 8. Same, except the other chromium salts are used in proportional amounts in the same order as in preceding test.

1. *Acid Dyeing.*—Acid dyeing, the shade a bright cherry red. Scouring test: Poor result; much of the original color removed and the cotton, wool and silk badly stained.

2. *Bichromate.*—With bichromate, shade a deep bluish violet. Scouring test: White wool and silk unstained; cotton stained slightly pinkish.

3. *Chromium Acetate.*—With chromium acetate, shade very similar to acid dyeing: Scouring test: Somewhat better than the acid dyeing, but wool, silk and cotton stained, the depth increasing in the order given.

4. *Chromium Chloride.*—With chromium chloride, shade and scouring test almost identical with the acetate.

5. *Chromium Fluoride.*—With chromium fluoride, same as preceding.

6. *Chromium Nitrate.*—With chromium nitrate, the shade a reddish violet. Scouring test: Nearly as good as the bichromate; the wool and silk, however, stained slightly; cotton stained considerably.

7. *Chromium Oxalate.*—With chromium oxalate, same as acetate.

8. *Chromium Sulphate.*—With chromium sulphate, same as acetate.

Acid Anthracene Brown FW

Dyeing Recipe

1. Three per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid and boil one-half hour.
2. Same, with the addition of 1½ per cent bichromate of soda.

3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing.*—Acid dyeing, the shade of light yellowish brown. Scouring test: Original color slightly weakened; white wool stained faintly yellow; silk stained very slightly; white cotton stained heavily pinkish.

2. *Bichromate.*—With bichromate, a full plum shade of brown. Scouring test: Original color firmly held; white wool and silk unstained; cotton stained slightly pinkish.

3. *Chromium Acetate.*—With chromium acetate, shade similar to acid dyeing, but duller. Scouring test: Similar to the acid dyeing, except that wool and silk are less stained.

4. *Chromium Chloride.*—With chromium chloride, shade similar to the acetate, but a deeper and brighter brown. Scouring test: Same as acetate.

5. *Chromium Fluoride.*—With chromium fluoride, shade similar in tone to that obtained with the bichromate, but very much lighter. Scouring test: Similar to bichromate.

6. *Chromium Nitrate.*—With chromium nitrate, shade similar to fluoride, but very much duller. Scouring test: Similar to the fluoride.

7. *Chromium Oxalate.*—With chromium oxalate, the shade similar to that obtained with the fluoride, but a little weaker and brighter. Scouring test: Similar to fluoride.

8. *Chromium Sulphate.*—With chromium sulphate, shade similar to that with chloride. Scouring test: Same as with chloride.

Acid Alizarine Blue SKY

Dyeing Recipe

1. One per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 1 per cent sulphuric acid, then boil one-half hour.
2. Same, with the addition of ½ per cent bichromate of soda.

3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing.*—Acid dyeing, the shade a clear sky-blue. Scouring test: The shade slightly weakened and brighter; white wool stained slightly bluish; silk stained

more heavily blue, and cotton stained slightly pinkish.

2. *Bichromate.*—With bichromate, the shade is considerably duller. Scouring test: About the same as preceding.

3. *Chromium Acetate.*—With chromium acetate, the shade about as bright as the acid dyeing. Scouring test similar.

4. *Chromium Chloride.* — With chromium chloride, same as preceding.

5. *Chromium Fluoride.* — With chromium fluoride, same as preceding, except slightly heavier.

6. *Chromium Nitrate.*—With chromium nitrate, same as preceding, except the shade is slightly duller and not so dull as with the bichromate.

7. *Chromium Oxalate.*—With chromium oxalate, same as acetate.

8. *Chromium Sulphate.* — With chromium sulphate, same as acetate.

Acid Violet 6RN

Dyeing Recipe

1. Three per cent color, 10 per cent Glauber salt, 10 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid, then boil one-half hour.
2. Same, with the addition of 1½ per cent bichromate of soda.
3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing.*—Acid dyeing, a bright red violet. Scouring test: Original shade considerably dull; white wool slightly stained; silk stained slightly bluish; cotton stained light violet.

2. *Bichromate.*—With bichromate, the shade a deep full blue, but somewhat dull. Scouring test: Wool and silk unstained; cotton stained slightly violet.

3. *Chromium Acetate.*—With chromium acetate, shade similar to the acid dyeing, but duller. Scouring test: Similar to bichromate, except silk is slightly stained.

4. *Chromium Chloride.* — With chromium chloride, similar to acetate.

5. *Chromium Fluoride.*—With chromium fluoride, the shade a full bluish violet. Scouring test: Similar to that with bichromate.

6. *Chromium Nitrate.*—With chromium nitrate, similar to the fluoride, but slightly bluer.

7. *Chromium Oxalate.*—With chromium oxalate, similar to the fluoride, but slightly redder.

8. *Chromium Sulphate.* — With chromium sulphate, similar to the acetate, but slightly duller.

Acid Alizarine Green CG Extra

Dyeing Recipe

1. Two per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid, then boil one-half hour.
2. Same, with the addition of 1 per cent bichromate of soda.
3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing.*—Acid dyeing, the shade a clear, bright bluish green. Scouring test: The wool slightly and silk somewhat more heavily stained, with green cotton unstained.

2. *Bichromate.*—With bichromate, the shade slightly duller and yellower. Scouring test: Wool very faintly and silk slightly more stained green; cotton unstained.

3. *Chromium Acetate.*—With chromium acetate, the shade similar to the acid dyeing. Scouring test: Similar to that with the bichromate.

Chromium Chloride, Etc.—With chromium chloride, chromium fluoride, etc., similar results, both as to shade and resistance of scouring test, as with the acetate.

Discussion of Results

The various dye and scouring tests make it evident that in the after-chroming process, results vary with different colors to a greater or less degree with the salt of chromium used.

In the main, all the salts of chromium change the shade less from that obtained in the simple acid dye than does the bichromate. The shades obtained with the various salts resemble each other more than they do those obtained with bichromate. Scouring tests with the various salts show in general an improvement in fastness, especially that obtained with the bichromate.

PROPERTIES OF WATER-GAS TAR

Water-gas tar has an entirely different origin from coal tar and, in addition, differs from coal tar both physically and chemically, states the U. S. Bureau of Mines. In appearance, however, it is much the same, except that it is much more fluid; that is, it has the consistency of water or oil. When a small quantity is rubbed between finger and thumb in a thin layer, it appears to be brown to black. Its specific gravity is very nearly the same as that of water, but when free from water the specific gravity may be as high as 1.15. Water-gas tar from small gas plants where the gas is produced intermittently varies more, both in composition and in physical properties, than in the larger plants where operation is continuous. Tars with specific gravities little greater than that of water (1.00) are not separated from water as readily as the heavier tars. Frequently water-gas tars are found that carry considerably more than 50 per cent of water. Such a fluid is, to be specific, an emulsion of tar and water, yet in appearance it is tar. Water-gas tar contains compounds known as paraffine, which are not present in coal tar. It is further distinguished from the latter by its not containing any appreciable amount of tar acids. Free carbon is seldom present in amounts greater than 1 to 4 per cent.

Alma Mills, Gaffney, S. C., have been incorporated with capital of $600,000 to manufacture cotton yarn and cloth. The new company will operate the plant formerly occupied by the Cash Mills. W. C. Hamrick is president and treasurer of the new company.

The Construction, Dyeing and Finishing of Homespuns

Great Variety of Effects Obtainable—Color Fastness to Milling and Washing Important—Bleaching for Brilliance—Recommended Dyestuff Types—Scouring, Milling and Fulling Processes—Little Finishing Necessary—Light Pressing Good Practice

By GEORGE E. TEMPLETON

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HOMESPUNS have had a season of popularity which shows every indication of being extended into the coming fall and following spring. Inasmuch as the writer has been largely occupied with the production of this class of goods during the present season, it may be of interest to others in the profession to learn something of his experiences.

There is practically no end to the variety of color effects which can be obtained in mixtures, to say nothing of the number of shades which can be produced by piece dyeing, cross dyeing, etc. Mixtures of white wool with violet, light blues, greens, gold, light browns and pleasing shades of blue grays and certain reds have been most in demand. The fabrics are simple in construction—plain weaves predominating, although some have been made with basket weaves, but the latter are not generally as serviceable as the former. A majority of the better quality homespuns are made from a medium-grade wool ranging from 1,000 to 1,200 ends in the warp and from 16 to 20 picks per inch, of from 40 to 55 grain yarn, 20 yards basis. As this is an "easy" constructed cloth, it should be perfectly woven, with little mending, if any, required, and extreme care should be used when burling.

The colored wools used in blending should be dyed with colors fast to milling and washing and which are bright and snappy. The white wool used should be bleached, an operation which may be performed simply and inexpensively with the use of permanganate, bisulphite and sulphuric acid—a very excellent white being produced by this process.

The Bleaching Process

The wool which is to be bleached should be well scoured and evenly wet out, and then immersed in a bath containing from 3½ to 4½ ounces of potassium permanganate to every 10 gallons of water for from thirty to forty-five minutes. It is then drained and immersed in a fresh bath containing from 3½ to 4 ounces bisulphite, 64 deg. Tw., and from 4 to 6 ounces of sulphuric acid (concentrated) to every 10 gallons of water. The wool is worked in this bath for from one and one-half to two and one-half hours, or until such time as the brownish cast or stain left on the wool by the permanganate has turned to a pure white; it is then thoroughly rinsed and extracted. Bleached wool when used in mixtures tends to make the effect more "lively." A comparison of two cloths made from the same mixture, in one of which bleached wool is used and in the other unbleached, will show a startling difference. One can therefore imagine the effect upon a buyer who may be comparing two cloths from different mills which show this difference.

Choice of Dyestuffs

As previously mentioned, the colors used in the blend should be bright; such types as Alizarine Sky Blue B, Alkali Fast Green 3G, Cloth Red B, Chrome Blue GD, Superchrome Garnet Y, Alizarol Yellow 3G and GW, and Chrome Orange GR are a few of the types which are particularly recommended for this work as giving excellent results. Another type not so widely used as might be is Violamine, which gives a brilliant shade with 1 or 2 per cent of color dyed acid, and which, when after-chromed, stands milling, does not stain the white wool and is very level dyeing, although the latter is not necessarily an essential requirement for this work.

Scouring, Milling and Fulling

The blend of wools should be well mixed before carding and a good grade of wool oil used in the emulsion so as to eliminate the necessity of a too harsh scouring. The fabric should be constructed so as to require not over one hour of milling, and should be so laid out in the loom as to enable it to be fulled in both length and width, or to be at least trapped during the entire process of fulling.

The soap used should be of sufficient body and strength to master the grease in the material from the time the goods are soaped in the fulling until they receive the first soaping in the washer, which should not require any additional soap but simply the application of a little hot water (about 110 deg. Fahr.) to start a lather. After running in this first soap for from fifteen to twenty minutes, rinse thoroughly and give a light second soaping. Either a palm or olive oil soap

should be used, and very little ought to be required to bring about the desired results. Soaps of this character are recommended because of the fact that the goods are easily freed from all traces of soap and no odor is left in the material.

After the goods have been rinsed in hot water for from forty-five minutes to one hour they should then be rinsed in cold water and enough cold water left in the machine to cover the material, with about 1 per cent of dilute sulphuric acid added to the bath. The goods should be run in this solution for fifteen minutes and then thoroughly rinsed in cold water. The treatment in the acid bath will have a tendency to brighten the colors in the blend, but should never, under any circumstances, be used until all trace of soap has been completely washed out, and under no conditions should acid be applied to goods which are to be piece-dyed.

Finishing

After washing, extract, dry, steam, shear fairly close on both sides with raising and laying-on brush both in use. The fabric should be sheared, not "scraped," until the weave comes up clear and threads show plain and round.

Homespuns, as a rule, are not pressed, but are given a good steaming, although as a matter of fact a light pressing with what is termed a cold cylinder and a hot bed is good practice. In other words, the goods are really not pressed but "rolled" through the press, which, while admittedly a form of pressing, is in reality nothing more than ironing or straightening out the fabric; no semblance of press or sheen belongs to what is known as a genuine homespun fabric. It will be noted that very little finishing is required. With the use of wools which are free from burrs and vegetable matter, goods will require very little, if any, specking.

By making use of ten different colored wools mixed with from 50 to 75 per cent white wool, a very wide range of colored effects may be produced, and by crossing the warp with different colored filling, or vice versa, and using the same range of colors, an almost endless variety of color-scheme effects can be worked out.

Notes on the Dyeing of Direct Blacks on Cotton Piece Goods

Applications of the Direct Blacks—Dyeing Jet Blacks—Treatment of Boiled-Out Gray Material—The Dyeing Process—Economizing on Dyestuff—Suggested Plant for Production of Jet Blacks with Substantive Colors—Its Operation and Advantages—Dyeing without Salt—Special Plant Necessary—Simplicity of Operation—Results

By RAFFAELE SANSONE

THE dyeing of direct blacks, so largely practised before the introduction of sulphur colors, and some time thereafter, owing to the dyers not liking the use of the sulphide of soda crystals necessary for the former colors, is still conducted to a certain extent nowadays. More care, however, is exercised in the choice of the products purchased, because sulphur blacks are offered at lower prices than direct blacks and the convenience in the substitution can only be made to result from some special good qualities of the direct blacks themselves.

The great simplicity in the preparation of the baths, the avoidance of the danger of tendering—which sometimes takes place in the dyeing of sulphur blacks—the less frequent production of stains, or bronzing, and the easy decomposition of standing baths, especially when left unused for some time, have made many dyers stick to direct blacks, only dyeing in sulphur blacks when this could not be avoided, or when very fast colors were required.

Various Applications of Direct Blacks

The applications of direct blacks are many, and often cover fields where the sulphur colors are valueless or have so far found little application. Some of these applications can be considered as follows:

1—The dyeing of jet blacks.

2—The dyeing of grays of different shade and fastness.

3—Dyeing as a ground for aniline black.

4—Dyeing in compound shades, as matching colors.

5—Dyeing of half-wool or half-silk goods.

6—Dyeing as a covering in calico printing.

7—Dyeing as a ground to be discharged in calico printing.

Among the above uses, the sulphur colors have so far only replaced the direct blacks for the production of fast jet blacks; in the others the direct blacks have so far maintained their secure position. For the above

(*Continued on page* 422.)

The Manufacture of Typewriter Ribbons and Carbon Paper

Several Days of Grinding Necessary—Record and Copying Inks—Varieties of Dyestuffs Used for Black, Purple, Blue Green and Red—Basic Dyes for Copying Inks—Preparation of Carbon Paper Inks—Domestic Raw Materials Now the Rule

By PAUL J. HASSETT
Assistant Factory Manager, Bridgeport Works, Remington Typewriter Company

COMPARATIVELY little is found in chemical literature on the subject of typewriter ribbons and carbon paper, and as the industry is quite an important one in the United States, using considerable quantities of dyestuffs, an outline of the manufacture may be of interest.

Typewriter ribbons are subjected to extremely hard usage on the machines, and in order to withstand this they must be very carefully constructed and finished. The best grades of ribbon fabric are usually made from long staple Sea Island or Egyptian cotton very closely woven, running from 290 to 320 threads per square inch. It is essential that the natural wax and accompanying impurities of the cotton fiber, as well as any warp size or oil accumulated in the manufacture of the fabric, be removed in finishing. The cloth must be as absorbent as possible in order to properly take the ink. The finishing process generally consists of one or more boils in Soda or Soda and Caustic, thorough washing, treatment with Malt or Diastafor to remove the warp size; but no chemic, as whiteness is not necessary.

Fineness of Grinding for Dry Colors Essential

The ribbon manufacturer receives the cloth from 36 to 40 inches wide and slits it into the required ribbon width, one-half inch being the most popular width. In the slitting operation, or following it, the edges of the slit ribbon are sealed with adhesive to prevent fraying. This is usually a glue solution made pliable with glycerine. The ribbon is then ready for inking without further treatment.

The inks are applied to the fabric by means of padding machines, in which steel or soft rubber rolls are used, the latter producing the best work, as the tendency which steel rolls have to crush the edges of the ribbon is thus eliminated. Ribbon inks are essentially a combination of dry colors ground in oil, with or without the addition of oil soluble colors. The dry colors must be in a finely divided condition in order to get the full benefit of them and to lessen the tendency of the ink to fill the type characters on the typewriter. Steel roller mills are generally found to be the best adapted for this fine grinding, and it is often necessary to grind a batch of ribbon ink for several days in order to produce the required degree of fineness.

Varieties of Black in Use

Ribbon inks are divided into two classes, record and copying, the so-called rapid roller and hektograph inks falling in the latter class. The record ink most used is black, and this is usually a mixture of Lamp or Carbon Black in oil toned up with the so-called Base or Oil Soluble Blacks. Suitable base colors are the Nigrosine and Induline Bases, which are dissolved in Red Oil or oleic acid, then ground with the Carbon Black on a mill of either the roller or hopper type. Black Record is the only ribbon ink suitable for permanent records. Writing made with it, by reason of its high carbon content, is practically permanent and will withstand prolonged exposure and the usual color destroying tests. The blacks for two-color inks are usually produced from Carbon Blacks without the addition of oil soluble colors, Iron Blue or Blue Lakes being used for shading the Carbon Blacks.

Violet Lake for Purple

The next in importance among the record inks is purple, which is a very long wearing color, but not permanent. This is made from a Violet Lake (usually Methyl Violet precipitated on a base of aluminum hydrate and blanc fixe) ground in a non-drying oil, such as lard, neatsfoot, peanut or mineral, together with the base of Methyl or Crystal Violet dissolved in oleic acid. The bases of Methyl Violet 2B and Victoria Blue B, when dissolved in oleic acid, have very high tinctorial strength, and by reason of this are extensively used in ribbon and carbon inks, both directly in inks of the same shade and for toning blacks. They impart long wearing qualities to the inks, but their use is limited to those for single color ribbons as no method has yet been found for preventing the colors from bleeding into each other if they are employed in bichrome or two color inks. For the latter Lake Colors ground in oil are employed

Blues, Greens and Reds

Blue Record Single Color Ink is made from Victoria Blue B Base dissolved in oleic acid combined with a Blue Lake ground in oil. Green is but little used and is made usually from a combination of Victoria Blue B

Base and an Oil Yellow dissolved in oleic acid. Red is largely used for two color record ribbons and is usually made from Lithol or Geranium Lakes ground in oil.

Basic Dyes for Copying Inks

Copying inks are made by grinding water soluble colors in non-drying oils. No solution is effected, the oil simply acting as a vehicle. The basic dyestuffs are practically the only class suitable for this purpose, although Croceine Scarlet and some of the Eosines find a limited use. Crystal Violet Extra is used extensively because of its high tinctorial strength and the rapidity with which it goes into solution. These properties are essential in dyestuffs for copying ribbon inks, particularly when the typewritten matter produced with them is to be copied on a rapid roller machine. In this case the typed sheets with a moistened sheet of tissue are passed rapidly through a set of squeeze rollers, and the writing is thus only momentarily in contact with a small amount of water. If concentrated and easily soluble dyes are not used in the work poor illegible copies will be the result. Small amounts of water in soluble colors—that is, Lake Colors —are sometimes added to the copying inks in order to preserve the character of the record after it has been copied. Rapid Roller and similar processes are largely used in foreign countries, but they have been quite generally replaced in this country by carbon paper as a means of making duplicates of typewritten matter.

Preparation of Carbon Paper Inks

Carbon paper inks are essentially mixtures of wax, color and oil. The colors and oils used in ribbon inks are generally suitable for carbon paper and the wax most largely used is Carnauba. It is employed either alone or with the addition of such waxes as Bees, Ceresine, Palm and Montan for special purposes In making inks the wax is melted in a mixing kettle, the oil and color added, then the whole is thoroughly ground. It is then remelted and applied hot to the tissue in a Coating Machine which has a means of regulating and equalizing the amount of ink applied to the tissue. From this equalizing device the coated tissue passes directly over the rolls kept cold by cold water which suddenly chills and sets the ink on the tissue.

In the olden days Logwood was the chief source of black for carbon paper manufacture, but this has been replaced by the Carbon Blacks made from natural gas. The trade calls for many different varieties of carbon paper and to meet this demand considerable skill and a thorough knowledge of the materials and colors he has to work with are required of the ink manufacturer.

Domestic Raw Materials Supplant Foreign

It is interesting to note that while practically all the raw materials for ribbon and carbon manufacture were imported prior to the war, the larger manufacturers enjoyed considerable export trade in the finished product, by reason of its excellence and their ability to meet price competition. Since the war satisfactory sources of raw materials have in most cases been developed in America and a considerable portion of the export trading is being regained in spite of the exchange conditions.

Things Every Textile Chemist and Colorist Should Know

[*Note—Under this heading is introduced as a more or less regular feature the discussion of certain fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.*]

No. 5
Manufactured Fibers

General Consideration

THE term manufactured fiber is applied to fibers produced wholly by a mechanical process in contradistinction to the natural fibers which are produced wholly by natural processes whether animal, vegetable or mineral. There are three types of such fibers, namely, the (1) manufactured organic fibers, including artificial silk; (2) manufactured mineral fibers, including glass wool and slag wool; (3) manufactured metallic fibers, including tensile thread, fine metallic wire and steel wool, but of these the manufactured fibers are by far the most important.

Manufactured Organic Fibers

General Consideration.—For various textile purposes there has always been a great demand for fibers possessing high luster. Of the natural fibers that are mechanically workable, silk possesses the most satisfactory luster, but its high cost has ever stimulated the desirability for a cheaper fiber that could, for many purposes at least, be a substitute for silk. Such a fiber apparently not existing among the natural fibers, investigators turned their attention towards the artificial production of a high luster fiber. Their endeavors along one line in particular have been highly successful and to-day we have several va-

rieties of lustrous fibers produced wholly through artificial means, although cellulose, the raw material used, is a natural product.

The principle involved in every case is that of forcing a semi-liquid substance through a very fine capillary orifice in such a manner that it may be solidified upon issuing from the orifice. In most cases a cellulose derivative is used as the raw material. The following four types have proved the most successful:

(1) Cellulose Nitrate, Pyroxylin or Collodion Silk.
(2) Cupro-ammonium cellulose silk.
(3) Viscose or cellulose thio-carbonate silk.
(4) Cellulose acetate silk.

The term "lustra cellulose" has been quite generally adopted as a term more nearly correct and less misleading than that of artificial silk.

In brilliancy and luster the lustra celluloses surpass in many instances even natural silk. Its uses, however, are somewhat limited, owing to its lack of durability as compared with natural silk and the fact that it becomes much weakened when wet with water and the various solutions incident to dyeing and finishing.

The first three types mentioned lose from 70 to 80 per cent of their tensile strength while wet, but the cellulose acetate silk loses only about 20 per cent of its strength while wet. On the other hand, cellulose acetate silk is very resistant to the action of certain dyestuffs and for this reason is much more difficult to dye than any of the other types.

Cellulose Nitrate, Pyroxylin or Collodion Silk (Chardonnet Silk)

This is the oldest type of luster cellulose and was introduced by Count Chardonnet about 1884. The manufacture of this type depends upon the fact that a solution of cellulose tetra nitrate in a volatile solvent solidifies when forced through a fine opening in cold water. The product is immediately dried and reeled in the form of a continuous fiber, a varying number of the individual fibers being combined. When made from pure pyroxylin the fiber is so inflammable as to be extremely dangerous. Methods have been devised, however, for treating it with various reagents such as ammonium sulphides and chlorides, the process being commonly designated as denitration. This treatment reduces its inflammability to a point where it is scarcely any greater than that of ordinary cotton. Colored effects are sometimes produced by adding the proper dyestuffs directly to the pyroxylin solution. This for various reasons is impracticable and it is most commonly dyed after it has been manufactured.

Cupro Ammonium Cellulose Silk

This is also known as "Glazstoff," "Thiele Silk" and "Pauley Silk." It consists in dissolving cellulose in a cupro ammonium solution and then forcing the gelatinous liquid formed through a fine capillary orifice into a bath of acetic acid containing sulphuric acid, where it solidifies. It may also be solidified by passing through a concentrated solution of caustic soda.

Viscose or Cellulose Thio-Carbonate Silk

This is prepared by forcing solutions of viscose through fine capillary openings into solutions of ammonium sulphate or dilute sulphuric acid where it becomes coagulated. Cellulose thio-carbonate or viscose, also known as cellulose xanthate, is prepared by first treating cellulose with a strong solution of caustic soda, and then digesting the product formed with carbon bisulphide under pressure which results in the formation of a yellowish brown pasty substance which dissolves in dilute caustic soda to a thick syrupy liquid. A high grade wood pulp is frequently used as the raw material.

Cellulose Acetate or Acetyl Cellulose Silk

Cellulose Acetate is prepared by a similar method to other lustra celluloses, a solution of cellulose acetate being coagulated by passing through water. Cellulose acetate silk seems to be quite different from the other types in many of its properties, particularly its action with dyestuffs, and also the effect which various liquids have upon it.

A solution of acetyl cellulose in tetra-chlor-ethane is used in the manufacture of the so-called "dope" for aeroplane fabrics.

Gelatin and Casein Silk

Many attempts have been made to produce artificial silk of animal origin by the use of gelatin, casein and similar products. These have been made in a semi-liquid form and forced through fine openings in an atmosphere of formaldehyde which coagulates the substance into a firm fiber. All attempts along this line, however, have proved failures from the point of view of practical manufacture, and are not commercial articles.

CORN MEAL SOAP

Ineffectual attempts have been made with oatmeal soap, corn meal soap and the like, but it has been left for a comparatively young concern, and one not previously engaged in the industry, to introduce to the markets of the world this new soap that is not—speaking strictly from a technical standpoint—a soap at all, although it is like it in every respect. The process of manufacture actually does convert the entire grain into an entirely new substance, still preserving the detergent or cleaning properties which the leading soap chemists of the country have sought for so long to include in the manufacture of soaps.

If the evidence of our own eyes is not enough, there is

available the written testimony of some of the best known industrial chemists in the world to-day, one of whom, the firm of Arthur D. Little, Inc., has stated: "We spotted some white cloth (cotton) with ink and blueberry juice and allowed them to dry over night, and then washed them with the powder (cereal soap). The stains were completely removed.

Laboratory experimentation upon the finished product, looking to find traces of the original corn meal, proves even with an iodine test that not a starch cell remains. To the lay mind this may not seem particularly important, but to those who are interested in the "why" of the various new products which reach the market from time to time, it is the answer to how it has been possible to improve the usual cleaning properties of soap to a point far beyond that ever reached before without the aid of acids and chemicals of a harmful nature.

As is usual with almost every real discovery big in its benefit to mankind, it is extremely simple in its elements. This new process of making soap is not only revolutionary in its final result, but also completely upsets the traditions of the fraternity of soap makers.

And yet, go to the expert chemists and ask why this soap accomplishes the seemingly miraculous, and you will be told that they do not know. Neither do the manufacturers. Many people are hard at work trying to find out and expect to know some day, but the truth remains at present that only a very few people in the world even know how to make it, and there is not one who claims to know why the finished product embodies the properties which it does.—"Journal of Commerce."

Mordanting Wool for Hematine

Fully Basic Mordant Gives Stronger Dyeing than Unreduced Mordant—Effects of Chromic Acid on Hematine—Sodium Bisulphite the Cheapest Reducer of Chrome—Strength of Dyeing Improved by Soda Treatment—Lactic Acid as an Assistant — Use of Alkali Other than Soda Ash Permissible

By A. B. CRAVEN

[*Read before the Midlands Section of the Society of Dyers & Colourists, and printed in the Journal of the Society*]

THE object of this work was to investigate the use of sulphites and bisulphites as chrome reducers in mordanting wool for Hematine, there being need for a cheap chrome reducer to substitute the very expensive tartar. America is no longer self-supporting as regards tartar and tartaric acid, and has now to share the European production, which will keep up the price.

It is well known that Logwood or Hematine dyed on reduced chrome is faster to light than when dyed upon yellow chrome mordant. Other advantages of the reduced mordant are that the dyebath is cleaner and the shade is faster to rubbing, as the yellow chrome mordant is never completely fixed, and some chrome always bleeds off into the dye bath.

Reduction of Mordant

Any yellow chrome remaining on the wool becomes reduced during the dyeing at the expense of the Hematine, and inferior fastness to light is the result. There is present in commercial Hematine other oxidizable matter which prevents the action of the yellow chrome from being really disastrous, but every dyeing on this mordant falls short of the high standard of fastness to light given by the reduced mordant.

Hematine is usually dyed on a yellow chrome mordant, as it is usually fast enough to light when so dyed, and the additional fastness obtained on reduced chrome is not considered worth the expense in time and material involved in reducing the chrome; but the reduced chrome mordant has the additional advantage of yielding deeper as well as faster colors.

Reactions of Chrome Reductions by Sulphites and Bisulphites

The reactions which take place when chrome is reduced by sulphites and bisulphites are—

Equation (0)

$$K_2Cr_2O_7 + 3H_2SO_3 = K_2SO_4 + Cr_2(SO_4)_2(OH)_2 + 2H_2O$$

Equation (1)

$$K_2Cr_2O_7 + 3Na_2SO_3 7H_2O + 3H_2SO_4 = K_2SO_4 + 3Na_2SO_4 + Cr_2(SO_4)_2(OH)_2 + 23H_2O$$

Equation (2)

$$K_2Cr_2O_7 + 3Na_2SO_3 7H_2O + H_2SO_4 = K_2SO_4 + 3Na_2SO_4 + Cr_2(OH)_6 + 19H_2O$$

Equation (3)

$$2K_2Cr_2O_7 + 6NaHSO_3 + 3H_2SO_4 = K_2SO_4 + 3Na_2SO_4 + 2Cr_2(SO_4)_3(OH)_2 + 4H_2O$$

Equation (4)

$$2K_2Cr_2O_7 + 6NaSHO_3 + 2H_2O = 2K_2SO_4 + 3Na_2SO_4 + Cr_2(SO_4)(OH)_4 + Cr_2(OH)_6$$

Sulphurous acid is, of course, the effective agent in all the equations.

Equation (0) shows the reaction when the exact amount of sulphurous acid required reduces bichromate.

(1) is very similar to (0). The sulphite and sulphuric acid liberate 3 mols. of sulphurous acid yielding exactly the same end product as in (0).

(2) is different, in that less sulphuric acid has been used. If this reaction proceeds to completion the end product would be $Cr_2(OH)_6$.

(3) uses bisulphite of soda, and is the sum of (0) and (1), and has the same end product.

(4) uses bisulphite without addition of sulphuric acid, and if this proceeds to completion the end product will be five-sixths basic.

The amount of sulphuric acid used would not in any case leave an excess of acid after reduction.

Results of Four Test Mordantings

Based on these equations, four mordantings were done, using 3 per cent chrome for one hour in the water bath at the boil. The temperature attained in the mordanting bath was 96 deg. Cent., which is the same temperature as is obtained on the large scale when boiling with open steam.

The four mordantings were then treated for one-half hour in accordance with equations (1) to (4) respectively, the additions being made to the mordanting bath without removing the patterns.

No. (1) pattern was fully reduced.

No. (2) pattern was cream color, slightly under reduced.

No. (3) pattern was pale green, like (1).

No. (4) pattern was cream color, slightly under reduced.

The result shows that equations (2) and (4) do not proceed to completion, some of the sulphurous acid remaining ineffective.

There were two patterns in each bath, and after rinsing, one of each was dyed with 4 per cent Hematine Crystals (fully oxidized). Taking the strength of the best of the four dyeings as 100, and using that as a datum line throughout the work, the comparative values of the set were 1 = 88, 2 = 100, 3 = 88, 4 = 94.

Careful Control Needed

The result shows that this method of reduction needs careful control to yield uniformly good dyeings. Sulphurous acid is a powerful reducer, and much quicker in action than tartar or other organic reducer, and it appeared at this stage that the cause of the weaker dyeings might be that an excess of sulphurous acid had been used; as patterns (2) and (4), which were scarcely fully reduced, and consequently would not have excess of sulphurous acid, were the strongest dyeings.

Patterns (1) and (3), which were fully reduced, would have a slight excess of sulphurous acid, for although the amount used was exactly enough to reduce the chrome, the wool itself would reduce some of the chrome, and there would be sulphurous acid equivalent to this chrome in excess The patterns were well rinsed before dyeing, but wool very tenaciously retains sulphurous acid, which would therefore be carried into the dye bath, where it would deoxidize the Hematine and thus cause weaker dyeing

Results from Second Set of Patterns

A second set of patterns was chromed exactly as before with 3 per cent chrome, and reduced in a separate bath with the same amount respectively of sulphite or bisulphite and acid. Here all the patterns were fully reduced.

In this case the sulphurous acid will be in excess in all cases because the chrome left in the mordanting bath is out of the way, and there will be therefore less sulphurous acid consumed, and more available to show any harmful effect upon the dyeings for which sulphurous acid may be responsible.

The patterns were rinsed and dyed as before, and the strength came out as follows: 1 = 40, 2 = 80, 3 = 30, 4 = 56. The strength is in the same order, but all are strikingly weaker than the first set. Duplicate patterns were mordanted and reduced at the same time.

Sulphurous Acid as a Cause of Weakness

In order to confirm the suspicion that sulphurous acid retained by the wool was at the bottom of the trouble, the No. (3) of the second set was repeated, but before dyeing the mordanted and reduced wool was worked in a bath containing peroxide of hydrogen to oxidize the sulphurous acid and prevent the action on the Hematine. Care was taken to avoid excess of peroxide. The pattern was then washed and dyed, the result being a strength of 100, conclusively proving that sulphurous acid in the wool was the cause of the weakness and variation of strength noted.

It was now clear that the minimum of sulphurous acid must be used.

In another experiment the excess of sulphurous acid was neutralized in a bath containing 2½ per cent soda ash on the weight of wool for a quarter of an hour in the water bath. This treatment gave a remarkable improvement in the dyed strength in every case, the first set reaching a strength of 120, all four being practically equal. The second set gave strengths varying from 100 to 110.

This soda treatment improves even those patterns of the first set (numbers 2 and 4), which, being barely reduced, are unlikely to hold excess of sulphurous acid.

Comparing this with 3 per cent chrome alone and with 3 per cent chrome reduced with tartar we get: Reduced by sulphurous acid and soda treated, 120; chrome alone, 102; chrome and tartar, 102. The strength of 120 is exceeded when the minimum of bisulphite is used in a separate bath.

Secondary Effect of Soda Treatment

There was evidently another action of the soda ash besides removal of sulphurous acid, and to confirm this another pattern of No. 3 of the second set was treated with peroxide of hydrogen to remove the free sulphurous acid, and then further treated with soda ash and dyed. This proved that the secondary effect of the soda treatment gave an improvement of 20 per cent in strength.

The equations show that with the exception of No. 2 the end product is not fully basic chromium hydrate, and it seems clear that the production of a non-fully-basic mordant is inherent to reduction by this method. It therefore appears that the strongest dyeings with Hematine are only obtained upon a fully basic reduced chrome mordant, and the second action of the soda is to bring this condition about.

Bisulphite was recommended by Koechlin for reducing chrome as long ago as 1853, and later by Knecht. The method has never become general, and the reason probably lies in the behavior above described.

In a patent in 1915 for the use of sulphite of soda and sulphuric acid, H. E. Wood evidently prefers sulphite to bisulphite for reducing chrome for Logwood Black and Alizarin colors. His method is to mordant with 1½ per cent chrome and 2 to 4 per cent sulphuric acid for three-quarters of an hour, and then add about 2 per cent sodium sulphite, and continue half an hour longer.

Sodium Sulphite vs. Bisulphite

The superiority of sodium sulphite over an exact equivalent of bisulphite has been corroborated. The difference in strength is evidently produced through the greater acidity when bisulphite is used, which gives a less basic reduced chrome. Soda treatment before dyeing improves both, and makes both practically alike.

Another reason why sulphite is preferred by Wood for the alizarin colors may be that bisulphite often contains a trace of iron, while sulphite is usually free from iron.

Long washing after mordanting would remove some sulphurous acid if excess was present, and produce a more basic mordant, but this action is always incomplete, so that long washing is far less effective than alkali treatment of very short duration No. 3 of the second set improved from 30 to 40 by washing forty minutes as against from 30 to 100 by soda treatment.

he more usual chrome mordants are not so liable to produce variable results as the sulphurous acid reduced mordant with chrome alone.

Destruction of Color Shows Reduction of Hematine

The chrome is partly reduced by the wool itself, and this reduced portion is fully basic, but the unreduced chrome existing on the wool cannot act as mordant until it is reduced, so that it becomes reduced during the dyeing, and chiefly at the expense of the Hematine, but when reduced the mordant will be fully basic.

If no destruction of color took place this dyeing would be equal to the maximum strength, so that the extent it falls short will be the measure of the destruction of Hematine, and the shade on 3 per cent chrome alone was weaker than the maximum by 20 per cent.

The amount of destruction will vary with the difference in reducing power of the wool and its cleanliness, and may be less than 20 per cent in some cases. The amount of chrome fixed upon the wool was only one-quarter of the 3 per cent used, after one hour's mordanting. There is no advantage of soda treatment in this case.

With 3 per cent chrome and 1 per cent sulphuric acid, the amount of chrome fixed is greater than in a sweet chrome bath. Some reduction takes place by the action on the wool, and the remainder of the chrome is unreduced. The portion of the chrome reduced is certainly not fully basic, but will become so when reduced in the Hematine dye bath. With this mordant the destruction of Hematine is greater than with chrome alone.

A trial was made with 3 per cent chrome and 1 per cent sulphuric acid, in which the mordanting was continued until the whole of the chrome was reduced by the wool. This green mordant gave an improvement of 20 per cent by treatment with soda, showing clearly a lack of basicity.

Alkali Treatment of Mordant

The chrome-tartar mordant again shows improvement of about 12½ per cent by soda treatment. There is no destruction of dye in this case, but the mordant is not fully basic. Tartaric acid and other chrome assistants behave in a similar manner to sulphuric acid or to tartar, so that there seems no assistant available which will reduce the chrome and at the same time give a basic mordant can be improved by alkali treatment before dyeing with Hematine

The reduction of the chrome and the alkali treatment can be combined on one operation by using an alkaline reducing agent, e. g., hydrosulphite and soda ash or glucose and soda ash. Both methods are more expensive than bisulphite first and soda ash afterwards.

Lactic Acid Reduces Chrome Completely

Lactic acid needs special mention. It reduces the chrome completely, and entirely exhausts the mordanting bath in one hour when used in the proportion of 3 of chrome to 4 of true lactic acid. With this mordant there is no liability to variation, and the strength obtained without soda treatment is quite good, and as the bath is exhausted the soda treatment can follow in the mordanting bath, and by neutralizing any alkalinity left with a little acetic acid the same bath may be used for dyeing. Thus the reduced and fully basic mordant, and consequently maximum strength, may be obtained in one bath.

A probable explanation of the non-basic mordants yielding weaker dyeings is that a body of the type $Cr_2(SO_4)$ (Hem)$_2$ is formed, whereas for full strength

Cr_2 (Hem)$_3$ should be produced. After dyeing on such a mordant as will produce a weak shade, the color is not left in the dye bath as would have appeared possible.

The ferric iron mordant also gives a weaker shade when it is not basic, and a still more important disadvantage is that the non-basic iron mordant is not fast to light. If the mordant is fully basic, the dyeing is stronger and is fast to light.

Recommended Mordants for Hematine

The following mordants have been found satisfactory on the small scale, and are recommended to the dyer for use with Hematine—[Bisulphite 78 deg. Tw. containing 25 per cent total SO_2.]

For 3 per cent Chrome alone.—Reduce in separate bath with 1 to 1½ per cent bisulphite and 0.2 to 0.3 per cent sulphuric acid.

Without soda treatment the reduced mordant dyes 5 to 10 per cent stronger than the unreduced mordant. Soda treatment with 2½ per cent soda ash on the weight of the wool gives a strength about 20 per cent stronger than the unreduced mordant.

For 2 per cent Chrome and 0.5 Sulphuric Acid.—Reduce in separate bath with 1½ per cent bisulphite and 0.3 per cent sulphuric acid.

This, when soda treated, gives a strength about 25 per cent stronger than the unreduced mordant.

For 3 per cent Chrome and 1 per cent Sulphuric Acid.—Reduce in separate bath with 2½ per cent bisulphite and 0.5 per cent sulphuric acid.

This, when soda treated, gives a strength about 25 to 30 per cent stronger than the unreduced mordant.

In all cases the shade on reduced mordant is brighter than on the unreduced mordant.

For Chrome and Lactic Acid.—Two per cent chrome, 5 1/3 per cent lactic acid (50 per cent by weight). Three per cent chrome, 8 per cent lactic acid (50 per cent).

Both baths will be completely exhausted in one hour. Soda treatment and dyeing may follow in the same bath.

It might be suggested that instead of using a fully oxidized Hematine, a less oxidized product be used, so that when dyeing upon a yellow chrome mordant the color would be fully oxidized and the chrome reduced, and thus obtain all the benefits of a reduced mordant very simply. In practice this is not satisfactory, for although there is less destruction of Hematine there is certainly some destruction on account of the conditions under which the color is oxidized.

Summary.—The following facts have been established —Hematine is sensitive to oxidation by chrome in the form of chromic acid, and also sensitive to reduction by sulphurous acid.

Chromic acid destroys some Hematine during the dyeing, and also detracts from the fastness to light of the dyed black. The reduced chrome mordant does not destroy any Hematine during the dyeing, and when fully basic gives a much stronger dyeing than an unreduced mordant. However reduced, and whether soda treated or not, the reduced mordant gives a much superior fastness to light.

Bisulphite of soda is the cheapest reducer of chrome, and when no excess is used, the dyeing with Hematine is stronger than upon any unreduced mordant.

With soda treatment, the strength is still further improved. Lactic acid is an assistant which reduces the chrome and exhausts the bath at the same time when used in the proportions given. Chrome and lactic mordant without soda treatment gives stronger dyeings with Hematine than any yellow mordant, and with soda treatment a further maximum improvement is obtained.

A new additional advantage of reduced chrome has been disclosed in this paper—the improvement in strength brought about by soda treatment.

Alkali other than soda ash may be used, ammonia or borax being just as effective.

In conclusion, the writer desires to acknowledge his indebtedness to the directors of the Yorkshire Dyeware & Chemical Company, Ltd., in whose laboratory as Selby the work was carried out, for permission to read this paper before the Society.

WRINKLES IN FABRICS

Every finisher of every kind of fabric runs into wrinkles at times which he would gladly dispense with. There are fulling mill wrinkles, washer wrinkles, dye-kettle wrinkles, crabbing machine wrinkles, steamer, napper, teased gig, brush, sander, shear and press wrinkles. All of these may be termed mechanical wringles.

Then there are physical wrinkles, such as lay wrinkles, crow's feet wrinkles, frozen rigs, wrinkles from cockles, truck wrinkles, and pile wrinkles on face goods.

Wrinkles and their various causes, phases, methods of prevention, and their several cures, if thoroughly gone into, means a long, long story.

Tightly woven worsteds, also cotton worsteds, develop wrinkles easier than any other fabric. On dark colors especially, they invite all the inborn ingenuity there may be in a finisher to keep his goods clear of them. The ordinary washer wrinkle on worsteds runs slightly on the diagonal lengthwise of the piece, generally running in from the listing towards the center and once in a while the reverse is true. The writer has found that overcrowding or filling a washer to capacity is one of the most frequent causes of this. When eight pieces of heavyweight worsteds are run in an eight-string washer, and appear at the perch showing wrinkles, six pieces of the same goods put in the same washer and scoured in the same way will come out invariably entirely free from wrinkles. On light shades, as a rule, eight pieces can safely be washed in an eight-string washer, as light shades seldom show wrinkles.

When washer wrinkles do appear the cure is really homeopathic, for that which put the wrinkles in is the best thing to take them out, and that is pressure.

Every finisher has his pet cure for wrinkles, and there are seldom two of a similar opinion. One believes in

small pot eyes in the ring board, another in large pot eyes, and yet another would forthwith dispense with pot eyes of any description. The next says the only thing is an oblong eye set on the bias. Each and every one of these contentions denotes a method to be employed to cause the goods automatically to change their position every time they pass under the squeeze roll of the washer.

It matters but little how the goods are made to change the fold if there is light pressure on the top roll, or if the soap is too thin and watery or too strong in alkali. When the soap has done its duty it is necessary to follow up with an automatic opening out of the goods in the bottom of the washer in a plentiful supply of water. They should be allowed to squirm and wriggle around like so many snakes tangled up together.

The best way to accomplish this is to have two automatic outlets, about 30 in. from the bottom of the washer. Two 3 in. holes should be bored in the sides of the washer that distance from the bottom and about the center of the machine. The bottom gates may now be kept closed and the water allowed to rise until it finds egress through these holes. There is no better method for forcing goods to change their position, and no safer or saner thing to do, for a washer thus equipped will now take care of itself without watchful waiting. By causing the goods to run in so much water they also rinse out better and free themselves from the soap quicker. Washer wrinkles are sometimes called water marks, which is a wrong designation, for water marks are a different difficulty and have nothing to do with a washer. They are also called breaks and cracks, but washer wrinkles is the correct name for them.

Worsted serge is often one of the hardest pieces of goods a finisher has to deal with in the matter of wrinkles, and when they do appear there is usually an argument between the dyer and finisher as to who is responsible. At times the dyer is the guilty one, and quite often it occurs in the finishing department; and it also occasionally happens that neither of them is at fault.

Weaving the cloth in a more open reed, or the taking out of a couple of picks per inch, may remove the trouble and still result in the production of just as close a fabric finished. A too tightly woven fabric will, of course, crack very easily both in the washer and dye-kettle, whereas, if the same cloth is made looser, it will bend instead of breaking or cracking when in the rope shape. It will, during various processes of dyeing and finishing, close up to the same density and be as firm and much softer in handle when ready for the market. By laying them properly in the loom the chances of wrinkled goods are practically eliminated, doing away with the necessity of refinishing, with all its doubtful effects.—"Posselt's Textile Journal."

The rumor that gained considerable headway to the effect that the Arlington Mills were to be merged with the American Woolen Company has been emphatically denied by Franklin W Hobbs, president of the Arlington Mills.

U. S. MINES BUREAU ISSUES REPORT ON PROPERTIES OF TOLUOL

Pure toluol (also known as toluene) is a colorless oily liquid with an odor somewhat like that of benzol, states the United States Bureau of Mines in Technical Paper 268, just issued. Its freezing temperature is low, nearly 100 deg. Cent. Its boiling point is 111 deg. Cent. and its specific gravity is 0.872 at 60 deg. Fahr. Its chemical properties are in many respects like those of benzol.

Commercial toluol, a product of which 90 per cent will distill below 120 deg. Cent., is usually obtained from crude benzol. The crude benzol distilled between approximately 100 deg. and 120 deg. Cent. is termed commercial toluol and has a specific gravity of 0.862 to 0.870 at 60 deg. Fahr. The uses of this product are similar to those of the benzols. Having a higher boiling point it is less volatile and dries more slowly when used in varnishes and similar preparations—an advantage in many of these preparations. It is a valuable ingredient in turpentine substitutes.

Commercially pure toluol may be prepared from the 90 per cent toluol by further distillation and rectification. As the boiling point of pure toluene is 111 deg. Cent., the fraction separated begins to boil at 111 deg. Cent. and to yield 95 per cent at about 111.8 deg. Cent. or 100 per cent within 2 deg. of the boiling point of toluene, that is, 111 deg. Cent.

Chemical plants work this product into a more refined product. Commercial toluol is the source of the explosive T. N. T. (trinitro-toluene), of dyes for cotton, of synthetic flavoring, and perfume materials, and of other chemical compounds.

In the physico-chemical study of sulphur in coke, being made by A. R. Powell, physical organic chemist of the Bureau of Mines at Pittsburgh, Pa., experiments have been conducted on the study of the decomposition of calcium sulphide. It was found that, working with boiling water at 100 deg., calcium sulphide is hydrolized very slowly, the rate being increased by the addition of magnesium oxide. Small-scale laboratory tests will be made on coke.

Andrew C. Imbrie, treasurer of the U. S. Finishing Company, said recently, "The progress of the American dye industry has reached a point where it is able to supply about 84 per cent of all the colors used by the average American consumer. For example, my own company, the United States Finishing Company —operating five plants engaged in the business of bleaching, mercerizing, dyeing, printing and finishing cotton piece goods, and with an annual capacity of 300,000,000 yards—is able to do with American colors, quite as good work as was ever done before the war with German colors of the same types. Applications for licenses to import German and Swiss colors have been necessary in less than 10 per cent of the colors used."

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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A NEW LESSON FROM ITALY

A RECENT dispatch to a Yorkshire newspaper states that Dr. Karl von Weinberg, one of the principals of the I. G., has purchased 51 per cent of the shares of the Bianchi dye manufacturing firm in Italy. According to the reported agreement, the Germans will give the Italian firm such technical and other assistance as may be necessary for the development of the business on a scale justified by current and future Italian economic conditions, and the German interests are to receive 51 per cent of the profits.

That there will be profits seems reasonably assured, despite the hard sledding which the Italian dye industry has experienced during the past few years. The I. G., for one thing, is not disposed to buy into anything which has no future, or which cannot be made to have a future, and certain it is that representatives of this giant organization are supremely well qualified not only to estimate the possibilities of a dye manufacturing concern but likewise to render aid of a character to bring about their realization.

That the Germans found a way to buy into the Italian dye industry is not at all surprising. They have for long enjoyed a strong foothold in that country, and, indeed, fully expected Italy to join with the Central forces in the war. Italy has been a ready market for the sale of German goods, transactions being financed in many cases by German-controlled Italian banks. Since the Armistice, with its Reparation provisions, German colors admitted under the terms therein laid down have offered the strongest sort of competition to the domestic products; for, while protective legislation similar to the variety in force here has been set up as a safeguard to Italian enterprise, all dyestuffs other than Reparation colors being imported in bond and subject to the control of the Italian Minister of Finance, nevertheless the demand has been so limited recently that Italy's share of the Reparation colors alone, which are accepted as shipped every few months, has been sufficient to flood the market. And on anything in the way of a dyestuff otherwise imported, Germany has distinctly had the call when it came to a question of price and service.

Hence, it would seem as though the step reported above was almost inevitable from the outset—or in any case became so when the slump hit the Italian dye consumers. Lacking adequate plant facilities, chemists, technical experience and the ability to sell with their products such service as the Germans could give, the Italian dye makers fought a losing battle. Whether or not the situation can yet be saved, or whether or not even the disposition to save it will survive, can only be surmised. The purchase of the controlling interest in the Bianchi company may be the beginning and the end, or it may be a new entering wedge for a resumption of "the old order," with Germany again exercising complete control of the dye situation in Italy. Whatever may transpire, however, the present successful move should be a lesson for the Senate, engaged at this writing in making up its mind on the question of American protection, to study and reflect upon.

With the help of the artificially maintained war embargo, the American dye manufacturers have held even with the game, in spite of competition from America's Reparation color allotment. But they are still very much in a false position, a position which is calculated to deceive anyone who has not examined the situation into concluding that they are well-nigh impregnably fortified. And if their position is not rendered solid in actuality as well as in appearance, the time yet may come when the industry will be startled by even more pertinent rumors than those, now being bandied about, to the effect that the British Dyestuffs Corporation has sold out to Germany. And what is more, the new rumors may turn out to be far better founded than the British. Above all things, that should never be allowed to happen here, nor need it happen if the Senate will but look to the stabilizing of the industry by adopting a settled policy for a term of years, instead of weakening it by failure to make up its mind.

A WELCOME HELP TO CHEMICAL INDUSTRY

THE American chemical industry is gradually eliminating the obstructions that nearly always appear in the path of a new and rapidly growing industry. These stumbling blocks are the natural results of individual effort which is not standardized. For instance, every producer of chemical equipment gives a special name of his own making to the products turned out by his factory. The result is that prospective purchasers are frequently confused by the

different names of similar products put out by several manufacturers.

Such annoyances, it is believed, will soon be done away with, since the newly organized Chemical Equipment Association has begun to function. At a recent meeting at the Chemists Club, New York, the Association formally adopted by-laws and outlined a plan of action. The objects of the Association are to:

Encourage high standards in the industry.

Promote a better knowledge of conditions controlling the industry's development.

Take steps to bring about definite understanding as to professional services rendered to purchasers in connection with sale of equipment.

Investigate conditions surrounding the resale of equipment originally produced for specific purposes.

Disseminate information as to methods of arriving at correct costs.

Standardize trade phrases.

Collect and disseminate information as to design, raw material and construction.

Take suitable and timely notice of, and action upon, matters of legislation, both national and State, which affect the members of the Association.

Collect and disseminate market statistics, both domestic and foreign.

Collect and disseminate information as to labor conditions and relations—

And enter into such other legitimate trade association activities as may be deemed in the interest and welfare of the industry.

The Association made a particular point in its by-laws of the fact that it will not undertake any activity which will restrain trade, limit production or competition, or regulate prices.

This Association is the fourth organization in the chemical industry. The Synthetic Organic Chemical Manufacturers, the Manufacturing Chemists and the Scientific Instrument Makers already have organizations. The Chemical Equipment Association is an organization of manufacturers of chemical process equipment.

One of the chief difficulties that have been encountered in the past concerns the matter of technical service in installing equipment in plants. For example, when a purchaser orders equipment from a manufacturer it is usually necessary for a technical man to go to the plant to properly install the new equipment, and also to give instruction in the care and operation of such equipment. There has been in the past confusion as to the proper method of charging for such service. The new organization will standardize equitable charges in such cases.

An equal degree of difficulty has frequently arisen over the resale of chemical process equipment manufactured for specific purposes. The handling of second-hand machinery of this character has in many cases fallen to men who know nothing about the manufacturing of chemical equipment. Now, through the Association, the heavy equipment manufacturers will endeavor to protect themselves and their customers by determining some new and better method of handling such second-hand materials.

This move of the equipment manufacturers to organize and eliminate duplications in trade nomenclature and the thousand and one other exasperating and time-wasting conditions arising from go-as-you-please, individualistic manufacturing and marketing, is in line with the general trend of the past year or so in our chemical industries, and is to be heartily welcomed as one more step in the direction of eventual unity and independence.

AN ALLIED ISSUE

THE objects of the Fordney tariff bill, according to the official title of this measure now occupying the intermittent attention of our Senators, are specifically "to provide revenue, to regulate commerce with foreign countries, *to encourage the industries of the United States*, and for other purposes."

During one of the series of debates which the proposed measure has occasioned recently, the following colloquy took place between Senators Walsh and Smoot:

Mr. Walsh: Mr. President, may I ask the Senator if camphor is not a very important product in the manufacture of celluloid?

Mr. Smoot: It is.

Mr. Walsh. And is it not a fact that Japan practically controls the entire output of camphor?

Mr. Smoot: She controls the entire output, with the exception of what little synthetic camphor was made in Germany before the war and what we made during the war; and to-day the one factory in the United States that made synthetic camphor during the war is closed entirely.

Mr. Walsh: Is it not a fact also that Japan took advantage of war conditions to demand a very, very excessive price for camphor?

Mr. Smoot: Not only did they double the price but in many cases they sold the camphor at an advance of six or seven hundred per cent.

Mr. Walsh: I think our celluloid manufacturers desire to have camphor put on the free list; and I notice that you have retained a duty, notwithstanding the fact that you say the only synthetic camphor factory in this country has gone out of business.

Mr. Smoot: That is true; but it will stay out of business even with the rate that we have provided.

Mr. Walsh: Why put a duty on camphor, then, if we are not producing it here?

Mr. Smoot: What the St. Louis people wanted was a 25 per cent ad valorem duty. If we had given them a 25 per cent ad valorem duty, that would have had to be carried clear through all the celluloid goods made

in this country, with a higher rate of duty; and the committee thought they could not go that far.

Mr. Walsh: One of the troubles with this bill and this schedule is the effort to maintain one little industry at the public expense.

Mr. Smoot: Of course we have not done that, however. The duty of 6 cents per pound provided on camphor is not going to do that. In fact, I think the Monsanto people will have to turn their camphor plant into some other line of industry.

It will be noted that Senator Smoot admitted on the floor of the Senate that the Japanese practically control the entire output of camphor, and that during the war "not only did they double the price but in many cases they sold the camphor at an advance of six or seven hundred per cent."

In the face of that statement of facts, he said: "I think the Monsanto people will have to turn their camphor plant into some other line of industry."

Senator Smoot is one of the Republican leaders in the Senate, but the position he has taken, with reference to the manufacture of camphor in the United States, is not in harmony with Republican principles of encouraging American industries, nor in accordance with the purposes for which the proposed new tariff bill is to be enacted into law.

The Monsanto Chemical Works already has an investment of over $600,000 in its undertaking to manufacture camphor in the United States. That investment will practically be wiped out—if Senator Smoot's views on the proposition are sustained by the Senate—and instead of encouraging an industry in the United States that will utilize hundreds of thousands of gallons of turpentine—an American natural product—and employ a large number of American workmen, he proposes the continuance of a Japanese Government monopoly, for the benefit of the Japanese and the Eastern seaboard importers of camphor.

N. M. Clark, vice-president of the Celluloid Company of America, testifying before the Ways and Means Committee said: "The competition from Japan threatens to annihilate us. Europe and America are in a similar position as regards camphor, which enters largely in our commodity, but Japan rules the world as to this item. We are at her mercy when we buy camphor. She tells us how little or how much we may have, the prices we must pay, and has systematically reduced our supply."

There is about five million pounds of camphor consumed annually in the United States.

This excuse for failure to provide properly for an industry in a peculiar position, or having a unique claim to consideration strictly on its own merits and irrespective of decisions in other cases, on the ground that legislative exceptions made in its favor must be duplicated throughout the interminable list, has a very familiar ring. It has repeatedly been used by foes of adequate protection for our coal-tar chemical industries whenever they have been driven against the wall, and they have particularly made use of it in reference to the dye portion of these industries. A contemporary even went so far on one occasion—which readers of The Reporter may recall—as to try to saddle the coal-tar chemical industries with the responsibility for placing an embargo upon *all* goods brought from other shores, advancing the absurd argument that since dye makers advocated an embargo in their particular case, they must uphold this principle universally, or forthwith abandon it!

In many ways the above issue is closely allied with the struggle of the dye people to obtain proper protective legislation, and if the Senate committee believes it can dismiss this issue in the fashion made apparent above it will find itself mistaken. Attempts to reduce all tariff problems to a common denominator, or to solve them all in some kind of a patent automatic tariff machine, were always futile and are, moreover, going out of style. This much can be said to the credit of our Solons, many of whom have seen the light. It now remains to convince the others and to complete the succeeding step leading to individual treatment for each problem as it arises. In this way only can a so-called "scientific tariff," which is spoken of so feelingly on the Senate floor at intervals, be created.

Meanwhile, the Senate proper will do well to review very minutely the findings of its committee with respect to the proposed duty on camphor.

Recent Patents

Bleaching Powder and Process of Producing the Same

(1,409,955; March 21, 1922)

Edward Thorndike Ladd and Eben Childs Speiden, Niagara Falls, N. Y. (assignors to Isco Chemical Company, Niagara Falls, N. Y.)

This relates to the bleaching powder known in commerce as "chloride of lime," and has for its object to provide a process for producing the same which will be simple and inexpensive to carry out, and a product which will be more efficient in use than those heretofore proposed.

It is well known that in preparing the ordinary bleaching powder it is customary to hydrate quicklime containing calcium oxide (CaO), thus producing what is commercially known as a "lime hydrate," which may contain magnesium hydrate and other impurities carried by the lime. This lime hydrate is next screened to separate therefrom the pieces of so-called "limestone" or so-called "core" of the lime lumps, as well as to separate out such other foreign or undesirable impurities as may be susceptible of being separated

out by screening. The so-called "lime hydrate" thus separated will be found to contain relatively coarse and fine particles, and the mass is next treated with chlorine in bleach chambers in the manner well known, so the "chloride of lime" or bleaching powder of commerce results.

The present inventors have observed that the lime hydrate, together with such impurities as have not been separated out by the above-mentioned process of screening, may be divided into a portion containing the relatively coarse and into a portion containing the relatively fine particles. They have also observed that if one separates out from the lime hydrate material a portion containing substantially all or a large percentage of the fine particles of hydrate and impurities present, leaving behind in a second portion a large percentage of or substantially all the coarse particles, and then treats said second portion of hydrate material with chlorine gas in the manner well known, a very different and useful product will result from that heretofore obtained. That is to say, the product of said treatment will be found to be a heavier and more massive bleach than would be the case if said finer particles had not been removed.

It is probable the larger percentage of coarser particles now remaining in said second portion of the lime hydrate mass before chlorination, changes the character or size of the pores, or interstices, existing between the particles of the hydrated lime and therefore permits a more thorough penetration of the mass by the chlorine than is possible in the prior processes, with the result that a better or more efficient chlorination ersults and thus produces a corresponding change on the properties of the finished product.

In the same way, the present patentees have further discovered that after removing all or a substantial percentage of the coarse particles to form said other portion of hydrate containing all or a substantial percentage of the finer particles present one treats this other portion with chlorine gas, a bleach powder will be obtained which is lighter and more fluffy than is the case when the coarser particles are left in the chlorinated mass. This change in the physical character of the last-mentioned product is also probably due to the change in porosity of the mass brought about by the fineness of the particles left therein, which must to a large extent govern the penetration of the said mass by the chlorine gas.

Each product thus produced is very different from the other, and also very different from a chloride of lime made by the ordinary processes without this new step which has been introduced. Further, each of these new products has its own special advantages for those uses to which it is especially adapted.

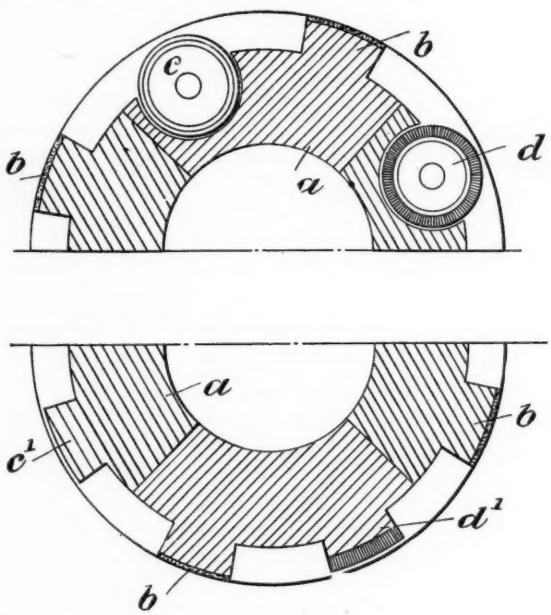
By the term lime hydrate found in the description and claims, inventors mean the product obtained by hydrating commercial lime, which usually chiefly consists of calcium hydrate [$Ca(OH)_2$] but often contains very substantial amounts of other substances among which may be mentioned magnesium hydrate.

Machine for the Production of Suede Cotton Cloth

(1,411,071; March 28, 1922)

John Dania Tomlinson, Rochdale, England

The invention is an improvement upon one for which patentee has obtained Letters Patent No. 1,218,131 for the production of cloth to imitate "suede" leather, in which rollers are used which comprises bars or lags of wood covered with carborundum and stretching rollers or expansion bars, in the combination making up the complete roller. He finds in practice, that while the carborundum lags are effective and produce a good result on the surface of the knitted fabric of fine Egyptian cotton, such carborundum surfaces individually tend to produce somewhat lengthy fibers, like hairs, on the surface



of the cloth. Such lengthy fibers are not necessarily got rid of by the next carborundum covered lag but their removal may require the successive action of several lags thus to some extent interfering with the "sueding" action by their very presence. As a result of this it may be necessary or desirable to pass the fabric more than once over the complete "sueding" roller or over more than one such rollers or otherwise to control the speed or running of said roller. Such fibers or hairy lengths produced by one lag are not necessarily got rid of by a succeeding carborundum covered lag although the end is ultimately accomplished A too drastic action of the lags may produce a streaky result which is to be avoided.

It is proposed to apply to the "sueding" roller comprising a number of carborundum covered lags or bars and having rollers or bars, or other devices for maintaining the cloth in its curved form when traveling on the roller, one or more needle or wire covered surfaces to

assist the action of the carborundum and to produce a better surface on the cloth. A needle or wire covered surface can be ground to a uniform face whereas a carborundum surface is necessarily uneven.

By means of the needle or wire covered surface, operating in co-operation with a carborundum surface, such projecting fibers are caught as the cloth passes thereover, and a more uniform suede surface is produced.

The accompanying drawings show, respectively: Above, a cross section of the upper half of a "sueding" roller in which is indicated a rotary needle or wire covered surface, and also a rotary stretching roller combined with carborundum covered lags; below, the lower portion of a sueding roller indicating a lag provided with a needle or wire surface, and also a stretching bar or lag and carborundum covered lags.

The sueding roller is or may be built-up of segments *a* provided at intervals around its periphery with bars or lags *b* covered with carborundum. Between such carborundum surfaces *b* are disposed alternately a stretching roller *c*, or stretching bar *c'*, and a needle or wire covered roller *d* or needle or wire covered bar *d'*. The needle or wire covered surfaces *d* are located between two carborundum covered lags *b* on or about the "sueding" roller periphery so as to come into action after a carborundum covered lag *b*, the intention being that the needle or wire covered surfaces shall so act on or influence the projecting fibers or hairy lengths which may be produced by a carborundum bar that the same are removed by the action of the succeeding carborundum bar and the fabric will then be straightened out by a stretching roller or bar. At present it is proposed to employ card or other wire or needle surfaces arranged around a roller surface or in strips or lengths, or otherwise upon a lag or bar, say in the space between any two carborundum lags or between such a lag and a stretching device as may be found most suitable.

There may be used only one such needle covered surface per roller or a number of succeeding ones, the series being distributed throughout the roller in the manner found most effective. Provision may be made for adjusting such needle covered surface with respect to the periphery of the complete "sueding" roller. Also with a view to obtaining an additional lateral stretching or straightening effect upon the fabric, the needle or wire surface may be disposed spirally from the center outwards on the roller, or at the desired angles on the non-rotary lag to have the same effect as far as possible upon the fabric as the stretching rollers or bars.

Dyestuffs of the Indigo Series

(1,412,038; April 11, 1922)

MAURICE BOUVIER, Lyon, France (assignor to Societe Chimique des Usines du Rhone, Paris, France)

The dimethyl-indigo, the methyl groups of which are in the para position with respect to the imino group, is derived either from the 1-nitro-4-methyl-6-benzaldehyde by condensation of the latter with acetone in an alkaline medium (J. Koetschet, "Revue des Matieres Colorantes," Vol. 5, p. 160, 1900), or from the alkaline melting of para-tolyl-glycine by the modified Heumann process. This coloring matter has not been adopted in practice owing to the dull shades with which it dyes wool or cotton.

The patentee has discovered that the properties of the said coloring matter are entirely modified by the introduction of one or two atoms of a halogen.

The halogenation can be performed by any one of the known methods. Several of such methods are given, for instance, by Richter, "Traite de Chimie Organique," Vol. 11, Paris, 1918, such as direct halogenation of indigo in the absence of water, in a hot benzenic solution, in concentrated sulphuric acid solution or in cold chlorsulphonic acid.

The p-p'-tolyl-dibromindigo-(5-5'-dimethyl-dibromindigo) has the appearance of a dark blue powder similar to the p-p'-tolyl-indigo. Its trace has a beautimul coppery sheen. Its properties are as follows:

In solution in—	Color of the Solution
Cold concentrated sulphuric acid.	Green.
Hot concentrated sulphuric acid at 100 deg. Cent.	Bluish green, sulphonated with difficulty.
Cold aniline	Green.
Boiling aniline	Very sharp blue.
Colt nitrobenzene	Blue, slightly greenish.
Boiling nitrobenzene	Blue, purple by transmitted light.
Chloroform	Little soluble, blue, slightly green.
Acetone	Little soluble, blue, slightly purple.
Benzene	Little soluble, purple blue.
Alcohol	Little soluble, blue green.
Carbon tetrachloride	Little soluble, purple blue.
Carbon sulphide	Little soluble, blue.
Acetic acid	Blue.
Hydrosulphite vat	Greenish yellow.

It is reduced by hyposulphite of soda in an alkaline solution in a similar manner to p-p'-dimethyl-indigo. But it behaves in an entirely different manner toward textile fibers, vegetable and animal.

The product is a dye both for cotton and for wool. It is therefore only to be compared with the ordinary di- and tri- bromindigos, the higher derivatives not being adapted to dye animal fibers.

On cotton the shades it gives are of a very decided and sharp blue, less reddish than those given by the dibromindigo and very different from those of the tribromindigo, which are very greenish. It covers and unites very well; its affinity is to be compared to that of the tribromindigo, which is very good; it is very superior to that of the dibromindigo.

While the di- and tri- bromindigos have but little sheen on cotton, our product has a relatively strong sheen similar to that of the tetra-bromindigo (Ciba 2 B blue).

On wool it is still more remarkable than on cotton; the dyes obtained by its means are extraordinarily sharp; its affinity exceeds that of the dibromindigo, which is considered as being very good and which is

the best of the series of the ordinary indigos; it exceeds also that of its orthomethylated isomer. It dyes wool in the darkest shades in one dip; the tints are comparable in sharpness with those of the finest acid dyes (Alizarine Blue, for instance). The p-tolyl-bromindigo dyes wool in the same tone as cotton, which is not quite attained with dibromindigo and far from being the case with tribromindigo.

To sum up, the introduction of the halogen in the molecule of the p-p'-dimethylindigo enhances considerably its affinity for wool and for cotton, as well as its coloring power; it modifies the shade of the tints and renders them more sharp and decided.

The mono-brominated derivative has similar properties, but less developed, being intermediate between those of the p-p'-dimethylindigo and those of the derivative above described.

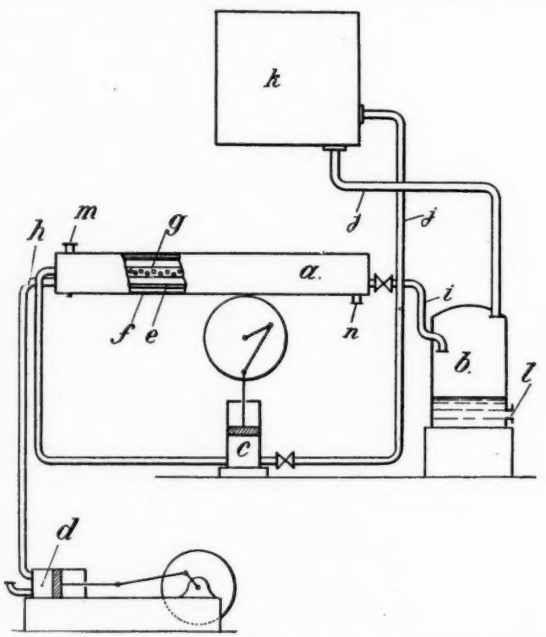
Process for Decomposing Soapy Waters

(1,410,882; March 28, 1922)

CHARLES BOUILLON, Paris, France

This invention has for its object a process for decomposing soapy waters into their primary elements, viz. fatty acids and mineral salts.

According to this invention a soapy water is treated with carbonic acid. The soap is decomposed, the free fatty acid being liberated, while the mineral salt becomes



dissolved in the water. Under pressure decomposition sets in rapidly, the rapidity of the action being greater if the operation takes place with heat and with continual agitation of the liquid to be decomposed so as to ensure constantly renewed contact between the liquid and the carbonic acid.

Under these conditions carbonic acid forms with the mineral salts in solution in the water carbonates and bicarbonates. The inverse reaction, viz. the reconstitution of the soapy matter is prevented by an excess of carbonic acid which maintains an acid medium in which the reaction cannot take place.

It is well to take precautions for preventing such reaction taking place when the operation is complete and for this purpose preventing the decomposition of the bicarbonate in the presence of the fatty acid obtained. Such decomposition can take place under the influence of heat after the separation of the excess of carbonic acid.

For this purpose, at the termination of the operation, the carbonic acid in solution is expanded to the atmospheric pressure which lowers the temperature of the mass and further allows the separation of the carbonic acid in excess and the liquid.

In this process the decomposition of the soapy waters may take place in a continuous manner in which case the process forms a true cycle; after expansion the carbonic acid is recovered and again compressed to react with still undecomposed waters.

Any suitable apparatus may be employed for carrying out the process.

An apparatus for carrying out the continuous process with the aid of heat is illustrated in elevation in the drawing.

The apparatus comprises a mixer *a*, a container *b* in communication with a carbonic acid compressor *c* and a pump *d* compressing the soapy waters.

The mixer *a* is formed in principle of a closed tube *e* heated by steam led into a casing *f* through the inlet *m*, *n* being the outlet for condensed water; within the mixer is a tube *g* provided with holes. The tube *e* receives soapy liquid coming under the pressure of the pump *d* through the pipe *h;* the tube *g* receives carbonic acid compressed by the compressor *c*. The carbonic acid in expanding in the liquid mass mixes and agitates it continuously.

A container *b* communicates both with the mixer *a* through the pipe *i* through which expansion takes place and also through the pipe *j* with the suction of the carbonic acid compressor *c*. It is provided with an outlet *l* for the fatty acid and the mineral solution.

The carbonic acid passes to the compressor c from the reservoir *k*.

Of course the decomposition of the soapy waters may be effected in a discontinuous manner by successive operations without recovering the carbonic acid.

This process is more particularly applicable for the decomposition of residual soapy waters derived from washing wool which have been almost completely freed by a preliminary operation from the grease they contain; such waters contain a small quantity of residual grease, organic matters and mineral salts derived from washing wool.

The treatment with carbonic acid has the advantage of not attacking the organic matters, i. e. not oxidizing them as will take place when sulphuric acid or hydrochloric acid is employed. The employment of such acids

gives rise to fatty acids contaminated with carboniferous matters which can only be removed by distillation. The treatment with carbonic acid produced on the contrary acids free from carboniferous matters. It is more advantageous to employ as mineral salt the carbonate corresponding to the base of the soap employed for the washing of the wool, such carbonate may be evaporated in a suitable furnace together with that derived from scouring, i. e. from the preliminary washing of the wool.

Brown Dye and Process of Making Same

(1,412,707; April 11, 1922)

William B. Richardson, Wilmington, N. C.

The present invention relates to the production of dyes by the treatment of dihydroxynaphthalene, and in this operation it is preferable to employ the 1-5-dihydroxynaphthalene, which may be produced in any suitable manner, and which may readily be obtained in a pure condition. The dihydroxynaphthalene is treated with concentrated nitric acid, the reaction mixture being preferably kept cold during the reaction and the mixture, after the addition of nitric acid, preferably being allowed to stand in the cold for several hours or overnight. If a highly concentrated nitric acid is employed—for example, one having a specific gravity of about 1.42—then it is necessary to keep the temperature low during the reaction. If a considerably weaker acid is employed, it is not necessary to keep the reaction mixture cold.

As a specific example of the process the following is given: 5.5 parts, by weight, of 1-5-dihydroxynaphthalene was slowly added with constant stirring to 54.6 parts, by weight, of nitric acid of 1.3 specific gravity. The stirring was continued for an hour; then 7 parts, by weight, of 1.42 specific gravity nitric acid were added and the mixture well stirred. The mixture was then allowed to stand for about thirty minutes. The reaction products were then poured into 100 parts or more of water; the solid reaction product was thereby precipitated, separated from the dilute acid by filtration and washed with water a number of times. A reddish brown product was obtained, whereas the original dihydroxynaphthalene used was of a somewhat grayish color. During the treatment it was not necessary to watch the temperature carefully, and the solution warmed up slightly during the operation.

The brownish pulverulent product is insoluble or only very slightly soluble in water, and in dilute nitric and sulphurous acids, but is very soluble in alkali solutions such as ammonia and sodium carbonate. It dissolves or decomposes and goes into solution in nitric acid of 1.42 specific gravity, and is not reprecipitated by the addition of a large quantity of ammonia water. The product does not seem to be entirely uniform, several samples having been tested giving a percentage of nitrogen between 3.75 and 5.5, and the latter percentage is somewhat lower than the theoretical per cent of nitrogen in mono-nitro-1-5-hydroxynaphthalene. These analyses were made by standard fertilizer methods; and although they show absolutely that there is as much as 3.75 per cent, they do not absolutely prove that there is not more than 5.5 per cent nitrogen, since some of the nitrogen may have been lost during the analysis.

In a different example of the process, a considerably stronger nitric acid was employed. During this operation it was necessary to cool the mixture during the reaction to prevent decomposition of the product. Patentee is not prepared to give a structural formula of the product, but believes that the same is a nitro-derivative.

The reddish brown material forming the product dyes unmordanted silk a brilliant light brown, dyes unmordanted wool a somewhat darker shade of brown, and dyes tannin-mordanted cotton a grayish brown.

Claims include the following: A dyestuffs constituting a reddish-brown solid material capable of dyeing unmordanted silk a brilliant light brown color, capable of dyeing unmordanted wool a slightly darker shade of brown, and capable of dyeing tannin-mordanted cotton a grayish brown color, which dyestuff may be prepared by reacting upon a dihydroxynaphthalene with nitric acid.

Method of Producing Alkyl Anilines

(1,413,494; April 18, 1922)

Homer Rogers, Wilmington, Del. (assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.)

This relates particularly to a process for producing alkyl anilines, but especially dimethylaniline by the treatment of aniline and methyl alcohol with an alkylphenylammonium iodide.

The object is to provide a process of this character by means of which alkyl anilines—as, for example, dimethylaniline—may be advantageously produced by the action of a compound containing iodine, and especially an alkyl iodide on aniline and an alcohol. A further object is to provide a process of this character in which the catalyst present is an alkylphenylammonium iodide such as trimethylphenylammonium iodide.

A further object is to avoid the loss of iodine which occurs when uncombined iodine is used as a catalyst, thereby avoiding the great expense incident to the loss of such an expensive catalyst.

A further object is to avoid the necessity of separating out the uncombined iodine at the end of the process where uncombined iodine is the catalyst used. The recovery of such uncombined iodine has necessitated the distillation of the alcohol water layer containing the same so as to recover the methyl alcohol present, and then the evaporation of the residue to dryness, after which the residue was subjected to treatment with sodium nitrite and sulphuric acid, then to filtration to obtain the crude iodine; the latter was finally purified by resublimation. Inventor holds that

it is not necessary thus to separate out the iodine, since alkylpheylammonium iodide, which is produced in the process, may be used subsequently as a catalyst.

For example: A quantity of aniline and methyl alcohol is mixed together with a small amount of methyl iodide in the following proportions: 93 parts aniline, 96 parts methyl alcohol, 1.35 parts methyl iodide.

The amount of the methyl iodide required is much less than would be required if the reaction were one of mere methylation so that the proportion of iodide may be said to be substantially less than a molecular proportion. Its functions is that of a catalyst. After the reaction is started the dimethylaniline formed from the methyl alcohol and aniline by the catalytic action of the methyl iodide combines with at least part of the methyl iodide to form an addition compound. This compound formed by the combination of methyl iodide with dimethylaniline is trimethylphenylammonium iodide and performs the same function as does the methyl iodide itself. The treatment is carried out in a digester at an elevated temperature. The liquids contained in the digester separate into two layers, one containing crude dimethylaniline and the other the excess of alcohol, together with water formed in the reaction and the trimethylphenylammonium iodide. The two layers are separated from one another and the layer containing the catalyst which is dissolved in water is first heated in a still in order to recover the methyl alcohol present and the residue is evaporated to dryness to recover the trimethylphenylammonium iodide usually mixed with small amounts of other substances. The trimethylphenylammonium iodide, from which the other substances may or may not have been removed, is then ready for further use in making a methyl aniline from aniline and methyl alcohol. If desired, the process may be begun by the application of this compound as a catalyst instead of methyl iodide. Other compounds of iodine act in a similar way. For example, hydrogen iodide or ammonium iodide have been found to serve the purpose instead of methyl iodide.

The present invention is an improvement on the process described and claimed in the application of Arthur E. Houlehan, Serial No. 179,228; this latter application is directed broadly to a process of making alkylanilines in which iodides are used as catalysts, and specifically to the steps of a two-cycle process in which methyl iodide is used in the first cycle, and a mixture of iodides obtained as a by-product from the first cycle is used as the catalyst in the second cycle. The present invention is directed to a process of making alkylanilines in which the catalyst is trimethylphenylammonium iodide.

Alpha Silk Company, Paterson, N. J., is reported to be contemplating the building of an additional plant to be used as a dyehouse.

Review of Recent Literature

Some Observations on the Behavior of Oxidized Cellulose. Edmund Knecht and F. P. Thompson, M.Sc.Tech.; Jour. Soc. Dyers & Colourists, XXXVIII, 5, May, 1922, p. 132.

Authors find that in the initial stages of oxidation of cellulose by permanganate in cold acid solution, the rise in copper number is nearly proportional to the amount of oxidant used up. After the use of a half-atomic proportion of oxygen the rise in copper number is very gradual.

The acetylization of oxidized cellulose was not found to give any indication of the effect of oxidation on the hydroxyl groups of cellulose. This was due to the very great reduction in the yield; highly oxidized cellulose gives a high yield of water-soluble products on acetylization.

When nitrated under identical conditions, oxidized cellulose gives products containing considerably less nitrogen than cellulose, and it is inferred that oxidation results in a suppression of the hydroxyl activity.

Owing to the strong reducing action of the oxidized cellulose, it was not found possible to obtain a labile nitrate.

Ground covered includes the quantitative relation between the degree of oxidation and the reducing power, and the preparation of oxidized celluloses; estimating the copper number; the effect of oxidation on the ester reactions discussed under the headings "The Acetylization of Cellulose and Oxidized Cellulose" and "The Nitric Esters of Cellulose and Oxidized Cellulose."

Transparent Effects on Cotton. H. Forster, British Patent 162,627.

Mercer's original patent substantially covered the treatment of cotton fabrics with strong sulphuric acid at a low temperature or with strong alkali, and it has subsequently been proposed to alternate the treatment.

In the patent (162,627) of H. Forster, transparent effects on cotton are obtained by first treating cotton or mixed fabrics with a weak acid and subsequently with an acid of greater concentration, and are finally mercerized after this treatment with caustic lye, which causes the effect to appear.

The process is carried out, for instance, as follows: Cotton fabric is treated with weak sulphuric acid of 49 to 50 deg. Be. at a normal temperature for one to three minutes, being stretched at the same time or subsequently. It is then washed and dried under as

great tension as possible. After this the cotton fabric is treated with strong sulphuric acid of 52 to 54 deg. Be. for three to five seconds at a normal temperature, being kept under tension. Finally, the wet material is mercerized while being stretched in the usual manner with caustic soda of 36 to 40 deg. Be. for several seconds. Between and after the separate operations, the material may be washed and squeezed in the usual manner or dried.

The product obtained has a silky luster and shows a transparent effect.

Instead of using the same acid first in a weak concentration and subsequently in a stronger concentration, the treatment may be carried out with different acids, the preliminary treatment always being that with the acid of weaker concentration. Instead of weak sulphuric acid, phosphoric acid, hydrochloric acid, nitric acid, a solution of chloride of zinc, or a solution of copper oxide ammonia can be used, the degree of concentration of these substitutes, where that of the sulphuric acid is 49 to 50 deg. Be., being for phosphoric acid 55 to 57 deg. Be., for hydrochloric acid a specific gravity of 1.19, for nitric acid 43 to 46 deg. Be. at 60 to 70 deg. Cent., and chloride of zinc solution of 66 deg. Be. at 60 to 70 deg. Cent. The weak solution of copper oxide ammonia which may be substituted for weak sulphuric acid is prepared by mixing 10 grams copper sulphate, 90 grams water, 5 grams glycerine and 9.5 grams caustic potash.

Fabrics of pure cotton or mixed fabrics can be treated by this process. The effect obtained is transparent and like glossy silk. The material can be treated uniformly over the whole surface or in parts only to obtain figured effects.

Bleaching. S. H. Higgins. Manchester, The University Press.

The bleaching industry, says Mr. Higgins in his introduction, was founded on empiricism, and chemistry has not yet fundamentally altered the processes used. A knowledge of chemistry cannot replace experience in the bleaching industry, but the author is not without hope that further investigations may enable chemistry to influence the introduction of systematic order in the bleaching industry. To this end he has reviewed in the present volume the research work that has been published during the period 1908 to 1920 bearing on the bleaching industry. He has had the advantage of a first-hand knowledge of the subject, and has planned out the work on ordered lines. He attaches importance to the possible good results which may be obtained from a study of the constituents of vegetable fibers. In another chapter he deals with scouring or the elimination of the non-cellulose constituents of the fiber. The elimination of waxes, of proteins, of mineral and pectic matters is dealt with, and then a chapter is given on the destruction of the coloring matter by oxidizing agents—viz., bleaching proper. He examines the various theories of the bleaching action of hypochlorites. Other chapters are given on hypochlorites produced by electrolysis; cellulose and water; cellulose and strong alkalies; cellulose and acids; cellulose and oxidizing agents; and cellulose—the bleaching product. A final short chapter on bleaching faults is given. The book bears evidence of the pains and care expended in collecting the information given.—Through "Textile Manufacturer."

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

L. D.—*Question:* What is the cause of the light streaks and clouds that appear so often on silk hosiery, and how may they be remedied?

Answer: In this case we will eliminate the possibility of uneven dyeing, as any irregularity in the dye would cause an entirely different appearance. The clouds mentioned are actually clouds of whitish appearance that seem to be on top of the color. Generally they are of two classes—one due to a sediment of insoluble matter, such as lime soap, precipitated silk gum or silica, and the second class to abrasions of the silk fiber itself. Needle abrasions follow the stitches vertically; dye bath abrasions are irregular. The best general remedy is to use only good soap for the boil-off, not to boil off too long, never boil or dye goods right side out and have the nets packed fairly full to prevent too much motion and tangles. We expect to cover this subject more fully in an article that is now in preparation.

C. P. S.—*Question:* When pure mineral oil is used as a fiber lubricant, whether for wool spinning, silk throwing or to lubricate threads in knitting, can it be absolutely removed later so it will not interfere with dyeing?

Answer: If the oil is applied in its natural condition it can only be removed by extraction with solvents such as benzine, benzol, carbon tetrachloride, etc.; but if it has been applied in the form of a perfect emulsion

it may be removed to a great extent, at least so as not to cause any trouble, by the regular soaping operations. It is doubtful that a perfect emulsion can be made of mineral oil and soap, but a perfect emulsion can be made if there is present a small amount of free fat acid, such as oleic acid (red oil). By far the best emulsions are those that contain sulphonated oils, because when the water evaporates on the fibers and the oils separate they remain blended and require only water to restore the emulsion. Consequently they are more easily removed and, even if not entirely washed out, allow the penetration of the dye liquors.

J. O. H.—*Question:* How are the cheap black furs dyed that are used for trimming cloaks and capes?

Answer: We cannot give you an exact working formula, as the conditions vary according to the work. The skins are generally bark-tanned rather than chrome-tanned. Mordants of alum and iron liquor are used and the dye consists of varying amounts of hematine, fustic and gambier applied at 120 deg. Fahr. Often they are after-chromed. It has not been found practical to use the regular fur dyes for such work, although they are always used on the higher grade of furs.

E. M.—*Question:* How may washable shades be produced on viscose art silk yarn?

Answer: There is available a great number of sulphur dyes, all of which will dye at a low temperature on art silk without injuring the luster or fiber. These will answer for the heavier colors.

Primuline, developed with various developers, furnishes another series, to which we may add all the other developing dyes.

Then, there is a limited number of direct dyes which are made fast by after-chroming.

Finally, the vat dyes of either the anthracene or indigo series.

In every case it is, of course, necessary to finish the dyeing operation in as short time as possible, rinse clean and soap, acidulate and dress up the skein to remove kinks before drying.

INTERNATIONAL CHEMICAL CONFERENCE TO BE HELD AT LYONS

The general program of the Third International Chemical Conference, to be held at Lyons, France, June 27 to July 2, inclusive, includes meetings of the Council, reports of committees and visits to factories in the vicinity. On July 2 the delegates will go down the Rhone by boat to the neighborhood of Marseilles, where they will have an opportunity to attend the second congress of industrial chemistry, which has been arranged by the Societe de Chimie Industrielle.

This congress will be held July 2 to 7. Among the general questions which will be considered are the animal, vegetable and mineral resources of the French colonies. In addition to this, fats, soaps, etc., will be discussed.

Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers: the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: *Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

2183.*—The purchase is desired by a firm in Spain of cotton, woolen and silk goods, buttons, notions, travelers' articles and household supplies. Quotations desired c. i. f. Spanish port. Correspondence should be in Spanish. References.

2264.*—A mercantile company in Australia wishes to secure agencies for the sale of artificial flowers, trimmings and ribbons for the millinery trade; hosiery and gloves, small tools, textile machinery and tin plate. Reference.

2268.*—A commercial agent in Ecuador desires to secure the representation of firms for the sale of cotton piece goods. Quotations should be given c. i. f. Guayaquil or f. o. b. New York. Terms: Cash against documents. Correspondence desired in Spanish. References.

2228.*—An agency is desired by a merchant in South Australia for the sale of cotton piece goods, manufactured cotton goods and men's wear. Quotations should be given c. i. f. Port Adelaide. Reference.

2229-2252.*—Owing to the lack of space, a number of "foreign trade opportunities" pertaining to drugs and chemicals have been grouped and can be obtained by reference to these numbers.

2225.*—An importing company in New Zealand desires to secure an agency for the sale of women's hosiery in pure silk, full-fashioned, lace, drop-stitch, em-

broidered, plain and fancy Milanese, and Italian silks in all the popular shades, medium and highest grades; artificial silk with mock seams, and seamless, cheap to medium class, all shades; silk gloves, in all shades and lengths, double tipped, all sizes, medium to better grades; and bandeaux, medium and better grades. Quotations should be given c. i. f. principal New Zealand ports. References.

2226.*—A mercantile firm in Bulgaria desires to purchase tailors' supplies of all kinds, including cloth, lining, threads, buttons and padding, of all grades. Quotations are desired c. i. f. Varna, Bourgas or Sofia. Reference.

2292.*—A manufacturer's agent in Canada desires to secure an agency for the sale of a good quality of women's silk hosiery. Quotations should be given f. o. b. shipping point. Reference.

2294.*—An agency is desired by a merchant in the Canary Islands for the sale of textiles. Correspondence should be in Spanish. References.

2259.*—A firm of commission merchants in Syria desires to purchase petrolatum, ammonium hydrate, alum, iron sulphate, magnesium sulphate, magnesium calcinated, nitric acid, sodium bicarbonate, castor oil, absorbent cotton, hosiery, handkerchiefs, shirts and like wearing material; and also secure an agency for the sale of alcohol, petroleum, benzine, sugar, rubber, leather, kid, box calf, candles, tin plate and coffee. Quotations desired c. i. f. Beirut and Haifa. Terms: Cash against documents at Damascus. Correspondence should be in French. Reference.

2260.*—An agency is desired by a firm in South Australia for the sale of electrically operated machinery, self-contained lighting outfits and miscellaneous electrical equipment, and machines for handling fibers, such as flax, wool and wood. Quotations should be given f. o. b. San Francisco. Terms: Cash and draft. References.

2276.‡—A request has been received from a firm in Germany that it be placed in touch with exporters and manufacturers of chemicals, particularly caustic soda, with a view to securing agencies. References.

1969.*—It is the desire of a mercantile firm in England to purchase from American manufacturers men's light summer underwear and fleecy winter underwear, and women's fleecy winter underwear (divided skirts and knickers). Quotations should be given c. i. f. English port. Reference.

1971.‡—A merchant in Mexico desires to secure the representation of manufacturers for the sale of men's clothing, such as cotton, fiber and silk hosiery, skirts and underwear, ready-made clothing and neckties. References.

2053.*—The purchase of silk stockings, fancy goods, notions, cutlery and tableware is desired by a wholesale dealer in Spain. Quotations are desired c. i. f. Spanish port. Correspondence should be in Spanish or French. References.

2025.*—A commercial agent in Austria wishes to secure an agency and also purchase hosiery, textiles and rubber shoes and galoshes. References.

2167.*—The purchase is desired by a merchant in Arabia of a fiber-stripping machine for cleaning sisal hemp. Quotations should be given c. i. f. Massowah. References.

2168.*—An inquiry has been received from an agent in Italy for securing an agency on consignment for the sale of spinning and weaving machinery for woolen-cloth industry. Quotations desired c. i. f. Leghorn or Genoa. Correspondence should be in Italian, French or German. References.

2094.*—A merchant in France wishes to purchase and secure an agency for the sale of silk and cotton goods, ribbons, veilings, gold and silver thread, real or imitation; raw goods and manufactured products, petroleum, industrial furnishings, and condensed milk and evaporated cream. Quotations should be given c. i. f. Havre. Terms: Payment against documents Reference.

2146.*—An agency is desired by a merchant in Syria for the sale of cotton and woolen goods, cotton yarns, sugar, alcohol, glucose, chemicals and wire nails. Quotations should be given c. i. f. Beirut, Haifa or Tripoli. Reference.

2101.*—A merchant in Italy desires to secure an agency on consignment for the sale of a red oil suitable for use in conditioning woolen cloths, and lubricating oils. Quotations are desired c. i. f. Leghorn or Genoa. Correspondence should be in Italian, French or German. References.

2141.‡—An importing company in the Straits Settlements desires to secure the representation of manufacturers for the sale of rubber shoes, canvas shoes with white rubber soles, haberdashery, raincoats, boots and shoes; cotton, lisle thread and silk hosiery; embroidery; cotton ducks, piece goods; white poplin canvas for shoemaking; materials for shoemaking; leather; enameled and aluminum ware; aniline dyes; foodstuffs, such as canned salmon and sardines; fruits, meats and sweets; hardware, and tools. Quotations

are desired c. i. f. Singapore harbor. Samples should be forwarded, as dealers are adverse to indenting on mere catalogues. No reference given.

2163*—A merchant in Italy desires to secure an agency on consignment for the sale of furnace coal and chemical products for use in woolen textile industry. Quotations should be given c. i. f. Leghorn or Genoa. Correspondence desired in Italian, French or German. References.

NOTES ON THE DYEING OF DIRECT BLACKS ON COTTON PIECE GOODS

(*Continued from page* 402.)

reasons the field covered by direct blacks is very large, and these are still of very great importance, even in the most modern cotton dyehouses.

The Dyeing of Jet Blacks

When a direct black is produced with direct colors, several problems may present themselves. An undesired shade may have to be covered with the black, or this may have to be produced from the start on boiled-out gray material. In the first case, a small-scale trial will be necessary in order to determine which of the works' blacks can be used by itself—or with shading colors—for producing the desired shade of black, as the color already present on the material can influence this very greatly. When this point has been settled, the dyeing is proceeded with on a large scale, using a dye bath of the most convenient strength.

A Boiled-Out Gray Material

When a boiled-out gray material is to be treated, the color may have to be produced only through the direct dyeing of a substantive black, through the dyeing and diazotizing of a black of the class of Direct Black BH, through the dyeing of a direct black fixed through chroming of the type of the benzo fast blacks, etc. The first black is the cheapest of the three, but not, however, the fastest. In this instance there is some difficulty in getting at the black which dyes in exactly the desired shade—which may be a brownish, a greenish or a bluish hue, or with none of these but instead a quite neutral shade.

If this is not available, the unsatisfactory black at the dyer's disposal will have to be shaded by stronger or weaker additions of shading colors, rendering the dyeing more costly and complicated on a large scale and often difficult for the foreman-dyer to produce exactly the same shade at different times. Besides the above difficulties, there are others that have to be overcome, and among these is the tendency of the direct blacks to bronze or to produce dull, shabby blacks; the non-resistance to alkalies which will be necessary if the water is hard, and the impossibility of making the black produce more than a very dark gray.

From the above, therefore, it will be seen that the dyeing of a jet black with direct blacks requires a nice discrimination in the choice of the products on the market, and it may often take some time before the dyer can obtain just what he wants.

The Dyeing Process

As already indicated, the dyeing of jet blacks can be conducted with or without soda; few blacks can, however, be made to dye a jet black without the addition of salt. The dyeing of jet blacks is mostly conducted on the jigger, although in some works continuous dyeing machines and beam dyeing machines are also employed. Among the three systems of dyeing, the second is certainly the cheapest when properly conducted and when very large batches of material have to be treated. When there is already a large battery or series of jiggers at one's disposal and the dye works produces blacks together with other colors, and never above a certain number of pieces per day, these are always the most convenient means, especially if they are constructed for dyeing the fabrics with very short baths. Beam dyeing is convenient when small batches of material are to be treated in as little space as possible and with little employment of labor.

Economizing on Dyestuff

It would be of advantage, in many cases, when dyeing continually, to treat the cotton fabrics first with a strong bath of the direct color containing no salt whatever, and then to complete the black by passing through another bath which should be kept as short as possible, and which should contain common salt and a given percentage of coloring matter. The first bath is caused to run slowly through for replacing all bath extracted. a given weight of salt being added at regular intervals for maintaining constantly within certain limits the density of the bath. In this way a good portion of the dye bath may be kept free of salt, while another small portion may contain principally salt and can be used over and over again, or for the exhaustion of the dye bath of a small lot of material after a convenient filtration.

Plant for Jet Blacks with Substantive Colors

For conducting the above new process of dyeing jet blacks with substantive colors, a plant constructed on the principle shown in *Fig.* 1 may be used to advantage.

This shows a very long vat of narrow width and separated into eight compartments (*a, b, c, d, e, f, g, h*), the first three of which (*a, b, c*) are employed for dyeing the cotton fabrics without salt, the fourth (*d*) for the treat-

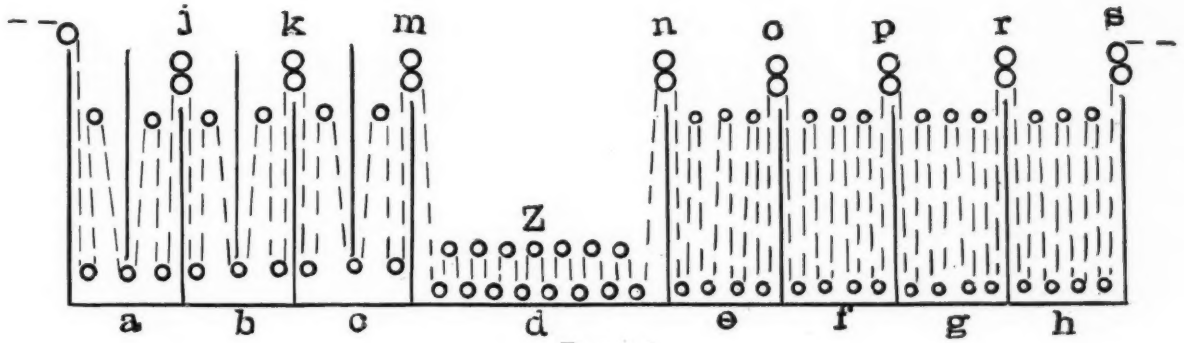


FIGURE 1

ment with salt, and the last four (*e, f, g, h*) for the recovery of the salt bath and the rinsing of the material. The first three vats (*a, b, c*) have each in their center an enameled iron diaphragm which divides them into two compartments having the same bath of treatment at their bottoms, each compartment being supplied with an upper and lower series of glass guiding rollers and having at its end a separation wall that is somewhat lower than the rest of the vat, and which is surmounted, so as to leave a free space in between, by a pair of glass pressing rollers (indicated in the three cases by *j, k* and *m*).

A similar arrangement causes the dye liquor, prepared in a separate vat at the back of the plant and entered at the top of the vat, to follow a zigzag course passing slowly below the separation diaphragms and above the lower separation walls, and ending in the fourth vat (*d*). This is of a certain width, and contains a double series of very low guiding rollers (*Z*), which remain below the strong salt bath destined to complete the dyeing. From the vat (*d*) all excess of dye bath passes out through an overflow tube, not shown in the sketch. The four following vats (*e, f, g, h*) are all of the same construction. The rinsing water enters, however, in the last of these (*h*), thence making its way slowly through the next and following vats. In vat (*e*) it escapes through an overflow tube.

The first four vats (*a, b, c, d*) are heated separately through a closed enameled iron serpentine coil, having a tap for the entrance of the steam and a steam trap for the elimination of all condensed water formed. For the introduction of the salt crystals the fourth vat (*d*) is supplied at one side with an entrance funnel, terminating in a distribution cylinder having a vertical agitator and placed in movement only when introducing the salt solution.

A small tap fixed in one of the sides of each compartment allows the drawing out of a small sample whenever necessary for controlling the work in each case and avoiding disagreeable surprises, such as the production of blacks of too little intensity, caused by a too rapid running through of the dye bath, a too strong reduction in the density of the salt bath, an imperfect treatment with the rinsing water, etc.

OPERATION OF THE PLANT

The working of the above plant would require a certain amount of experience at the start, which, once acquired, renders the operation easy and not fatiguing. When beginning work, the operatives first run through the empty vat a cotton tape, fixing to the end of this the end of the first piece to be dyed. When this operation has been conducted, they prepare the dye bath in a separate vat, enter the salt bath in the fourth vat (*d*), and initiate the passage of the running water through the four rinsing vats in the following succession: *h, g, f, e*, and regulating

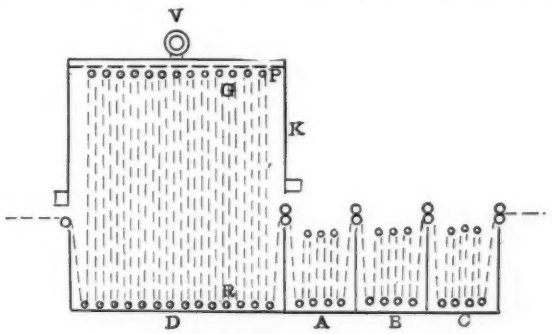


FIGURE 2

this so that through the overflow tube in the last vat very little water runs over.

At this point, steam is turned on in the steam coils in all compartments (*a, b, c, d*) and the plant is placed in operation. The cloth is thus entered in close succession, first through the first three vats (*a, b, c*), where, by coming continually in contact with the boiling dye bath and being pressed in between by the squeezing rollers *j* and *k*, it absorbs from the bath itself all coloring matter that can be fixed by the cotton material from the amount of the former employed; and when, after being pressed between the third pair of pressing rollers (*m*), it makes its way in the fourth vat (*d*) it already possesses a certain intensity of color, which varies, of course, in accordance with the nature of the direct coloring matter, or coloring matters, employed for the dyeing operation. In the fourth compartment the salt solution, containing a certain percentage of coloring matter, finishes off the dyeing operations, producing the jet black.

On making its way in the next compartment (*e*), the black fabric is rinsed with water containing a certain quantity of salt and coloring matter which is strongly increased, and on being pressed between the squeezing rollers (*e*) it enters nearly completely free from unfixed color in the next compartments (*f, g, h*), where it is treated three times with clear rinsing water, coming out ready to be further treated and dried. The water thus running through the different compartments (*h, g, f, e*) becomes little by little stronger and stronger in salt, the percentage of which can be regulated by increasing or decreasing its speed of entrance.

The salt bath escaping from the last compartment (*e*) is collected in an underground tank so as to be employed in the next dyeing operation and for dissolving any salt solution added to the bath in the fourth compartment (*d*). In this way, besides conducting the dyeing with economy, a good portion of the salt originally employed can be recovered.

Dyeing Without Salt

Although some other direct coloring matters can be dyed without salt, especially when it is necessary to produce light and medium colors, or shades, only grays or blacks of unsatisfactory depth can be produced with direct blacks. There is no doubt, however, that many of such black colors could be dyed in the intensest shade without salt, if the material were treated with them on a special apparatus or machine where, during the coloring, the material is subjected to repeated dyeing and drying. In this way several layers of the black would be fixed on the material in a manner more or less analogous to that obtaining when the salt is added to the dye bath, which, in reality, brings about a gradual salting out of the dyestuff which deposits more and more on the material. For conveniently obtaining this result, however, mechanical assistance is necessary, and this is only possible through the use of a specially constructed machine in which everything has been regulated for making the process work to the best advantage. The principle of a machine that may be employed for the purpose is shown in *Fig.* 2.

This shows a long enameled iron vat containing a long compartment (*D*) for the dyeing or coloring operations and three compartments (*A, B, C*) for the rinsing operations. The first vat (*D*) has on its lower portion a long closed enameled iron steam coil, in which boiling water or steam is circulated when necessary. This compartment contains a long series of glass guiding rollers (*R*), turning a few inches above the steam coil and having a few yards above another series of guiding rollers (*G*), also of glass, which remain below a sort of enameled iron cover (*K*), the upper portion of which is supplied with a perforated ceiling (*P*) and with a powerful ventilator (*V*). The lower portion of the cover contains two dispositions, through which hot air prepared in a separate apparatus is introduced. The three compartments *A, B, C* are of equal size, and contain an upper and lower series of guiding rollers. They are also supplied with squeezing rollers for rendering the treatment more effective.

Operation of the Plant in Fig. 2

For operating this plant, the operatives prepare the dye bath, which is caused to circulate slowly through the dye vat (*D*), entering at its end and escaping at its beginning. The cloth is then entered through the assistance of a long cotton tap, and is caused to run very rapidly and repeatedly between the dyebath and the drying chamber, fixing coating after coating on the material. In this way the material is colored to the darkest shade that the direct black can produce, and on making its exit at the end of the dye vat the rinsing waters that follow (compartments *A, B, C*) only eliminate the unfixed portion of the dyestuff.

Advantages of the Machine

The advantages of the above machine may not be apparent on first observation, as the new principle therein exhibited is quite unknown to many; some of the advantages can, however, be indicated as follows:

1—Owing to the rapidity with which the material is treated, it takes up with it a very large quantity of the dye bath, and this is compelled to fall back in the same while the cloth is reaching the upper guiding cylinders (*G*). In this way the deposition of the coloring matter is stronger.

2—The dye bath need not contain as much coloring matter as is usually necessary for producing a jet black, for the repeated partial drying of the wetted material brings about a concentration in the fabric itself of the former, which is deposited, layer after layer, in a manner more or less analogous to that taking place in the ordinary warm dye bath during the action in this of common salt or sulphate of soda crystals.

3—The bath in the dye vat need not even be warm if the direct black can remain in solution in it, or need only be toward 50 or 60 deg. Cent.

4—Through introducing a weak percentage of a thickening agent, with or without mineral additions, it is possible to thicken the material as well as to color it, thereby avoiding the necessity of a subsequent thickening or filling process and lowering the cost considerably.

5—The rapidity of the running of the material through the machine makes for a very strong production within a very short period of time.

6—The continuous running through of the material and the special arrangement of the plant require very little employment of labor, which consists merely in controlling the entrance and exit of the material, the preparation of the dye bath, the production of the hot air, the working of the ventilator and the operation of the guiding rollers.

7—Through regulating the speed at which the fabric is run in the dye bath and keeping this at constant

strength it is possible to change the intensity of the black produced, obtaining a light gray, a medium gray, a dark gray, a medium black and a jet black.

STRENGTHENING COTTON

A process for increasing the strength of cotton, developed in a New York finishing establishment, has recently been patented. It is claimed that cotton yarns and fabrics may be considerably strengthened by removing the natural waxes and oily substances forming a part of the fibers, provided these substances are removed in such a way as not to impair the structure of the fibers. These waxes and oils tend to decrease the friction between the fibers or the capacity of the fibers to engage and hold each other when spun and woven, and their removal gives greater strength to the product.

The waxes and oily substances are removed either by emulsification or saponification. They can be readily removed, and the finished product materially increased in strength up to 25 per cent by dissolving them with ether, benzine, benzole or similar solvents. They can also be removed and a corresponding advantage obtained by subjecting the fibers for a sufficiently long period to soap, thus emulsifying and removing them, or they may be removed by saponification, by treatment with a weak solution of soda.

As the object of the process is to strengthen the product, it is essential that whatever treatment is employed shall not be carried to the extent of affecting and weakening the structure of the fibers themselves, as is always the case in bleaching operations. In bleaching operations the waxes and oils are incidentally removed along with the coloring matters and other impurities, but the fibers are weakened by the severe treatment. This weakening in the old bleaching operations is due primarily to oxidation of the cellulose into new compounds by the strong acid, alkali or other chemical baths required in bleaching.

In the new process the bath is so regulated that no oxidation with resulting weakening takes place. The degumming in process may be effected by a milder treatment than that required for the bleaching process.

Owing to the desirability of having the waxes and oily substances present during the spinning of the yarn, it is better to remove them either from the yarn or, where the finished product is not to be bleached, from the finished thread or fabric. In case the yarn is to be woven, decided advantage is derived by removing the waxes and oily substances; by doing this the yarn is materially strengthened, and it is possible to obtain a much tighter weave, this advantage remaining even though the fabric is bleached, so that substantially all coloring matters and other impurities are removed.

If the yarn is to be manufactured into fabric by some other process than weaving, treatment of the yarn is beneficial because this reduces the breakage of the yarn during the manufacturing process and is of advantage even though there would be no advantage in securing a more compact fabric.

For ordinary gray goods the waxes and oily substances may be removed without injury to the fibers by extraction for one hour with commercial benzole at the boiling point of the benzole, or by boiling for three hours in a water solution containing 1 per cent of soap and 1 per cent of soda ash.—"Textiles"

WILLIAM SESSO

William Sesso, who was connected with the Geigy Company, Inc., and its predecessors for more than twenty-five years, died at his home in Farmingdale, N. J., on May 19. In 1890 he took over the management of the Philadelphia branch of John J. Keller & Co., and when the company changed over to the Geigy Aniline & Extract Company he became secretary of the new organization. Before coming with Geigy he was in the employ of Kuttroff & Pickhardt and of Lutz & Movious. In 1917 he retired from active business.

His death occurred suddenly, in the sixty-second year of his age. He was one of the best known aniline salesmen in the Philadelphia district, and one whose genial ways and charm of manner endeared him to all with whom he came in contact. His funeral was held on Monday, May 22, from the Church of St. James the Less, at Falls of Schuylkill, Pa., and was attended by a host of friends who mourn his loss.

NEW U. S. BUREAU OF MINES PAPER REPORTS ON ANTHRACENE

Anthracene is not usually produced in small tar works except as it exists in the anthracene-oil fraction obtained in distilling tar, according to W. W. Odell, fuel engineer of the Bureau of Mines, in Technical Paper 268, just issued. In such plants it is common practice to include this fraction with the creosote fraction, thereby enhancing the value of the latter as a wood preservative.

The crude product is obtained by cooling the anthracene-oil fraction and allowing the solids to separate and the oil to drain off. After the oil is drained from the solids, the latter are bagged and pressed or "whizzed" (centrifuged) to expel the oil still retained with the solids. This crude anthracene is usually sold as such. It amounts to about 5 or 10 per cent of the total distillate fraction from which it was obtained and contains approximately 15 to 35 per cent of anthracene. Different tars yield different amounts of anthracene. To purify the crude product further, it is either ground and agitated with hot solvent naphtha and drained, or is washed in a whizzing process with solvent naphtha. The dried product made in either way contains approximately 70 to 80 per cent of anthracene.

A high-grade commercial anthracene is sometimes prepared by redistilling the crude anthracene oil obtained in

the distillation of tar and separating a fraction that includes the distillate with a specific gravity higher than 1.07 at 60 deg. Fahr., the change or "cut" being made when the distillate coming over has a specific gravity of approximately 1.25 to 1.30 at 60 deg. Fahr. This fraction is cooled, drained of oil, pressed and washed, and sometimes sublimed. The sublimation process is like that employed for purifying naphthalene except that the enclosed anthracene pans are heated by direct fire and superheated steam is blown directly on the melted anthracene and a water spray is used to condense the product. The commercial grade of anthracene is known as 80 per cent anthracene. Its further treatment is left to the alizarine works or other chemical plants.

Exchange Fluctuations Upset Italian Dye Markets, but Bank Crisis Passes

Banca Italiana di Sconto Replaced by Banca Nazionale di Credito—Cheaper Coal, Raw Materials, and Better Power Facilities Aid Situation—Sales of Common Salt Masquerading as Dyestuff Continue Flourishing—Private Dyestuff Quotations

By RAFFAELE SANSONE

Genoa, May 5.
Special to The Reporter.

CONDITIONS during the month of April were upset by wide variations in the value of the Italian lira, which changed the United States dollar as follows: Lire—19.50, 18.70, 19.11, 18.35, 18.49, 19.50 and 18.50, respectively on the 1st, 4th, 7th, 15th, 20th, 25th and 30th of the month; the English pound sterling as follows: Lire—83.50, 82.71, 84.24, 81.27, 81.26, 84.50 and 83; and the German mark as follows: Lire—0.05, 0.06, 0.06, 0.06, 0.07, 0.08 and 0.07. The French franc remained between 1.70 lire and 1.80 lire.

The financial difficulties created by the crisis of the Banca Italiana di Sconto, which temporarily withdrew from circulation several milliards of lire in capital, were finally solved by the legalization of the agreement reached between the creditors and the old bank. The new bank formed (Banca Nazionale di Credito) will soon make the first payments, rendering possible a greater activity in many industries which had been suddenly crippled by the panic.

The Demand for Coloring Matters

The sale of dyestuffs of all sorts continued as usual, the products mostly demanded being the basic colors, the direct colors and the sulphur colors. Other colors in fair demand were Indigo (national and synthetic),

TABLE I

	April 1		May 1	
	(lire)	(dollars)	(lire)	(dollars)
Methyl Violet	70,000— 80,000	3,589—4,102	70,000— 80,000	3,743—4,278
Naphthol Yellow	50,000— 70,000	2,563—3,589	50,000— 70,000	2,673—3,743
Auramine	70,000— 80,000	3,589—4,102	70,000— 80,000	3,743—4,278
Orange II	30,000— 35,000	1,537—1,794	25,000— 28,500	1,336—1,524
Nigrosine, water soluble	30,000— 40,000	1,537—2,051	30,000— 40,000	1,604—2,139
Nigrosine, soluble in spirits	35,000— 40,000	1,794—2,051	35,000— 40,000	1,871—2,139
Sulphur Black	7,000— 10,000	359— 512	8,000— 10,500	427— 561
Acid Black	35,000— 40,000	1,794—2,051	31,000— 35,000	1,657—1,871
Direct Black	35,000— 40,000	1,794—2,051	31,000— 35,000	1,657—1,871
Chrome Black	40,000— 45,000	2,051—2,307	35,000— 38,500	1,871—2,058
Methylene Blue	80,000—100,000	4,102—5,126	80,000—100,000	4,278—5,347
Direct Blue	25,000— 30,000	1,281—1,537	24,500— 28,000	1,310—1,497
Sulphur Blue	45,000— 50,000	2,307—2,563	34,500— 38,000	1,844—2,032
Malachite Green	80,000—100,000	4,102—5,126	80,000—100,000	4,278—5,347
Acid Green	60,000— 70,000	3,076—3,589	60,000— 70,000	3,208—3,743
Direct Green	50,000— 70,000	2,563—3,589	42,000— 55,000	2,246—2,491
Bismarck Brown	40,000— 50,000	2,051—2,563	36,000— 42,000	1,925—2,246
Magenta (Fuchsine) Crystals	70,000— 80,000	3,589—4,102	70,000— 80,000	3,743—4,278
Eosine	60,000— 80,000	3,076—4,102	60,000— 80,000	3,208—4,278
Ponceaux	35,000— 40,000	1,794—2,302	32,500— 38,500	1,738—2,058

chrome colors, acid colors, alizarine colors, ice colors, etc. A certain increase was noted in the production of diazotized blacks, both on cotton socks and on cotton cloth.

Italian Color Works

The Italian color producers were favored during the month by much cheaper coal and raw materials, by an abundance of electric power, and also by the fact of there being little change in the price of the war reparation products and other colors offered on the market. A certain increase in the sales of dyestuffs for the dyeing of old clothes, as well as for internal domestic purposes, was noted, owing to the serious financial difficulties suffered. The dyestuffs sold for domestic uses were composed principally of large volumes of common salt containing only limited quantities of dyestuff. Mixtures of dyes with soap are little known in Italy.

Prices of Coal-Tar Dyes

The quotations of war reparation dyes in *Table I*, per ton in lire and dollars, show the great difference wrought by the lower United States exchange prevailing at the moment of writing, in comparison with the prices on the first days of April, and small differences that have followed in the quotations of war reparation products.

Mordants, Assistants, Dyehouse Products

The greater part of business in these products was

TABLE II

	April 5		May 5	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina	1,600	82	1,600	85
Chrome alum	3,000	153	3,000	160
Bichromate of potash	6,000	307	6,000	320
Ferrous sulphate	500	25	500	26
Copper sulphate	2,250	115	2,250	120
Tartaric acid	12,000	614	12,000	640
Aniline oil	10,000	512	10,000	534
White refined glycerine	9,000	461	9,000	481
Glucose, 45 def. Be	3,600	184	3,900	208
Hydrogen peroxide	2,100	107	2,100	112
Tannic acid, 60 per cent	20,000	1,024	20,000	1,069
Tartaric acid, crystals	10,750	551	10,750	574
Acetic acid, 30 per cent	2,800	143	2,800	149
Hydrochloric acid, 20-21 deg. Be	300	15	300	16
Formic acid	11,000	564	11,000	587
Lactic acid, 80 per cent	4,000	205	4,000	214
Alum	1,000	51	1,000	53
Ammonia, 22 deg. Be	1,450	74	1,450	77
Bisulphite of soda, 32 deg. Be	400	20	380	20
Chlorate of potash	3,100	159	3,100	165
Chloride of ammonia	5,000	256	5,000	267
Bleaching powder	900	46	900	48
Nitrite of soda	3,100	159	3,200	171
Yellow prussiate of potash	13,000	666	13,000	695
Yellow prussiate of soda	9,000	461	9,000	481
Caustic soda, 70/72	2,100	107	2,000	106
Silicate of soda, 140 deg. Tw	1,000	51	1,000	53
Sodium sulphide	2,600	133	2,500	133
Logwood extract	10,000	512	7,500	401
Yellow dextrine	3,500	179	3,600	192
White dextrine	3,800	195	4,000	214
Farina	3,250	161	3,400	181
Kordofan gum	4,900	251	4,900	262
Indigo, 25 per cent	22,000	1,128	22,000	1,176
Beta-naphthol	18,000	923	18,000	962
Industrial castor oil	5,000	256	4,800	256

conducted in northern and middle Italy, and principally in the regions of Lombardy, Piedmont, Liguria, Veneto and Tuscany. Some of the dollar quotations are given, per ton at Milan, in *Table II*.

Private Dyestuff Quotations

Some private quotations for dyestuffs at Genoa were as follows per kilo, showing the struggle against the war reparation products: Nigrosine in crystals, 26 to 30 lire; Sulphur Black, 7 to 10 lire; Chrome Black in powder, 35 to 38 lire; Acid Black, 35 to 36 lire; Direct Black, 35 to 36 lire; Sulphur Blue, 45 to 50 lire Chrome Red in paste, 80 to 100 lire; Direct Black, 50 to 55 lire; liquid Fustic extract, 7.50 to 7.60 lire; Logwood extract, 7.50 to 7.70 lire; Hematine crystals, 8 to 8.15 lire.

DU PONT ANNOUNCES PONTACHROME BLACK SW AND SWB, PONTAMINE FAST BLUE L, PONTACYL FAST YELLOW G, NAVY BLUE 3R CONC. AND NAVY BLUE R CONC.

New products announced by the Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., Inc., include Pontachrome Black SW and Pontachrome Black SWB, Pontamine Fast Blue L, and three Pontacyl colors designated respectively as Pontacyl Fast Yellow G, Pontacyl Navy Blue 3R Conc. and Pontacyl Navy Blue R Conc.

Pontachrome Black SW and SWB create a valuable addition to the company's line of chrome colors which leave silk-effect threads unstained. The SW produces a jet shade and the SWB produces a bluish shade. These products are level dyeing, possess good solubility, and are therefore suitable for dyeing in machines. It is expected by their makers that they will be greatly appreciated for dyeing piece goods with silk-effect threads. They are very good in their fastness to light, water, washing, steaming, rubbing, carbonizing, stoving, fulling, perspiration and street dirt.

Pontamine Fast Blue L is in its shade close to Solamine Blue, but is slightly brighter and greener. A notable attribute of this product is its great fastness to light for a direct dyeing product. Not being sensitive to acid, it may be dyed on silk from an acid bath.

Pontacyl Fast Yellow G is an acid yellow. It corresponds with the company's Pontacyl Fast Yellow Y, but is greener in shade. Before the war this product was widely used, owing to its good fastness, even dyeing qualities and solubility. Its even dyeing qualities are retained when added to the boiling dye bath. It is suitable for combinations in addition to being used for self-shades.

Pontacyl Navy Blue 3R Conc. and Pontacyl Navy Blue R Conc. are acid colors producing excellent bloomy shades of blue with the usual, very desirable, overhand tone. They are particularly suitable for dyeing ladies' dress goods in the piece. Their fastness is good to street dirt, steaming, light and rubbing, and perspiration, all of which are essential for the purpose mentioned. Their solubility is good and they have excellent level dyeing properties.

CHROME COLORS ON COTTON HANKS

By R. K. Sheth

Chrome colors are dyed only on cotton. The yarn is first well boiled (no soda ash or caustic is used) in a kier for eight to ten hours, rinsed well and hydro-extracted. The hanks are taken on sticks. The yarn is piled on the sticks in two lots equally separated from the middle. In all operations of dyeing chrome yellow and orange usually three turns are given to the yarn by hand in a cold solution.

Lime Water.—Usually quicklime is employed. In a settling tank lime water 1½ deg. Tw. is prepared.

Stock Liquor.—For dyeing one bale of 400 pounds of yarn, 60 pounds of brown sugar of lead and 30 pounds of litharge are dissolved in 10 gallons of boiling water and allowed to settle. The liquor should be 105 deg. Tw.

To produce a bright reddish yellow and orange, seven wringing posts are put up in one line, beneath which wooden tubs of suitable dimensions to dye one bundle of 10 pounds of yarn at a time are arranged.

Chrome Yellow

(1) The yarn is passed through lime water 1½ deg. Tw. and wrung; (2) passed through stock liquor solution diluted to 10 deg. Tw. with cold water and wrung; (3) again passed through next tub of lime water 1½ deg. Tw. and wrung; (4) again taken in lead bath freshened with stock liquor to the same strength and wrung; (5) passed through chrome bath prepared by dissolving 1½ pounds of bichromate of soda for each bundle of 10 pounds of yarn and wrung; (6) again turned in freshened lead bath and wrung; and (7) passed through chrome bath prepared as above and freshened from time to time. The yarn is finally passed through a hot hydrochloric acid bath containing 1 part of hydrochloric acid 32 deg. Tw. and 300 parts of water, soaped and dried.

Chrome Orange

To produce a bright chrome orange shade on yarn, instead of passing the chrome yellow yarn through an acid bath it is washed in clear water and passed through diluted boiling lime water, soaped and dried. The colors thus obtained are fast to washing and light.

Chrome Green

Chrome green is obtained by topping light indigo

blue with chrome yellow. Many direct cotton colors are on the market resembling chrome yellow and orange and green, but chrome colors are largely employed because the yarn becomes heavily weighted.—"Indian Textile Journal."

NATIONAL NEWS BULLETINS DESCRIBE NATIONAL PURE SOLUBLE BLUE, A AND B, AND NATIONAL CLOTH RED 2R

Two of the dyes recently announced by the National Aniline & Chemical Company, Inc., are National Pure Soluble Blue A and National Pure Soluble Blue B, which should be of interest to manufacturers of cotton, silk and paper, but especially to manufacturers of Gallo Tannate of Iron writing fluids, for which both of these dyes are particularly adapted.

National Pure Soluble Blue B will also find considerable use in the production of bright blues on leather, chip, straw, vegetable ivory and feathers.

National Pure Soluble Blue A surpasses in solubility, freedom from sediment and suspended matter all other soluble and cotton blues of domestic or foreign manufacture. National Pure Soluble Blue B is similar to this but somewhat weaker, duller and redder in shade.

National Cloth Red 2R, in shade and general properties, resembles the pre-war Wool Red B and Fast Bordeaux O. It is of special interest because of its good solubility and brightness of shade.

On wool National Cloth Red 2R produces shades of excellent fastness to water and perspiration, and good fastness to sunlight, crocking and fulling. It is applicable as an acid dye and by the different chrome methods, which makes it especially desirable for shading purposes in conjunction with chrome colors. Due to its neutral dyeing properties it is suitable for the dyeing of union material. Wool is dyed a full shade; silk and cotton are left much lighter. It possesses good affinity for silk when dyed in boiled-off soap bath broken with formic acid.

The company will be pleased to supply samples and full technical information upon request to any of its branches.

INDIANS BOYCOTT ENGLISH COTTONS

That the boycott on English cotton goods in India is complete, and the British textile manufacturers are now turning their attention toward developing trade with China, was the statement of H. E. Beney, of London, who arrived in Vancouver on the Canadian Pacific Steamship Company's liner "Empress of Asia" after an extended tour to the Orient. While the natives of India are not disloyal, and were most keen to pay their respect to the Prince of Wales on his recent visit there, they are absolutely under the rule of their leaders, many of whom are paid by German interests, stated Mr. Beney. No British cotton goods have been bought by them for some time past, as the natives are now weaving their own material by hand and by looms imported from Germany, and it is feared that the Lancashire mills have lost their trade for a considerable time at any rate.

The enormous field in China hitherto undeveloped, however, will more than repay the British manufacturers for their loss of trade with India, and they are now exerting every effort to increase their business. Mr. Beney suggests that Canadian manufacturers would do well to pay more attention to this field.

CAMPBELL OFFERS AMIDINE DIAZO BLACK BHO, AMIDINE FAST ORANGE Y AND ACEKO MILLING BLUE R

Recent circulars and bulletins of John Campbell & Co., 75 Hudson Street, New York City, describe products of this concern being marketed under the designations Amidine Diazo Black BHO, Amidine Fast Orange Y and Aceko Milling Blue R.

The first of these, or similar products, has been used by colorists and mill men under various designations, such as Diazo Black BHN, Diamine Black BH, Oxamine Black BH, Diazine Black H Extra, Naphthamine Black CE and Direct Navy Blue, various marks.

Amidine Diazo Black BHO dyed with common salt or Glauber salt produces an intense navy blue on cotton, of good fastness to washing. It dyes very level, and in the dyeing of mixed fibers composed of cotton and wool, or cotton, wool and silk, it scarcely stains the animal fiber when properly applied. It is also one of the most commonly used cotton colors for solid union blues in conjunction with Aceko Cyanine or Pershing Purple. It is a serviceable color for artificial silk, and is likewise an excellent product for speck-dyeing "burls" in worsted or woolen piece goods. As a saddening color for browns and tans and cordovans on hosiery fibers, cotton yarn and cotton raw stock, it is highly recommended by its makers.

Amidine Diazo Black BHO is also used for navy blues for silk piece goods which have to stand washing, this being accomplished by developing with betanaphthol or betanaphthol mixed with resorcine. Discharge printers find it useful for obtaining clear whites in conjunction with "Camelite," another product of the company described elsewhere in this issue, and dyers generally who wish samples for experimental testing may obtain them on application to the company, which also stands ready to submit practical results on any fiber of which a sample may be furnished.

Amidine Fast Orange Y is a valuable product supplementing the company's cotton color series. It is serviceable for straight cotton dyeing or yarn or pieces, and likewise for artificial silk. It possesses great covering power which, when combined with its good properties of fastness to light, acetic acid, alkali and washing, makes it attractive in quality and value. It is recommended by its makers for fabrics composed of cotton and silk, as the latter fiber remains unstained

when properly applied. It discharges in light shades only. Desirable khaki shades are produced after using this product as a grounding color together with Amidine Fast Yellow 4G and Amidine Blue BHO. While the fastness of Amidine Fast Orange is generally satisfactory, the company recommends that its customers make their own "tests for fastness."

Aceko Milling Blue R is a new Acid Blue dyestuff which has been brought out for woolen and worsted dyers, and for hosiery manufacturers and silk skein dyers. It produces bright, bloomy shades of fair fastness to light and good fastness to milling. It is recommended for dark colored or stripped shoddies and silk noils that are intended for yarns in which fastness to washing is the main requisite. It is fast to the action of chrome and is used as a brightening agent for Chrome and Alizarine colors. This product is likewise a valuable type for unions, as it dyes well in a Glauber salt bath. Tests for fastness should be made for the particular purpose for which the color is intended to serve.

BURLAP LEADS ALL U. S. IMPORTS OF TEXTILES

A recent report of the United States Tariff Commission on jute cloth may be briefly summarized as follows:

Imports of burlap, which is used chiefly for bags and wrappers, as a backing for linoleum, and as paddings in coats, are far greater in value than imports of any other textile. Ordinarily, the value of foreign burlaps consumed yearly in the United States is about equal to the combined value of all the wool manufactures imported under schedule K, and of all the countable cotton cloth. In 1920 about 1,065,000,000 yards of burlap valued at $88,896,000 were imported. Total imports of wool manufactures in the same year were valued at $50,453,000 and of countable cotton cloth at $44,913,000.

The only type of jute cloth produced in the United States is the heavy coarse wrapping, known as cotton bagging, used for covering raw cotton. About 90,000,000 yards of bagging are required annually to cover the American cotton crop. Practically all of the new cotton bagging consumed in this country is supplied by two American companies, which are the world's leading manufacturers of this article. Because of the strong organization of these companies, and their long prominence in the field, the volume of imports is small.

The United States, however, is about to lose its bagging industry. The two domestic companies are now erecting bagging mills in India, and have shipped abroad part of the bagging machinery formerly operated in this country.

The United States is the world's greatest consumer of burlap, importing about 260,000 tons of fabric yearly. Notwithstanding the tremendous demand, which has more than trebled in the last twenty years, the domestic production of burlap has been insignificant. The record American output was during the war when 7,292,000 yards were produced—less than 1 per cent of the domestic consumption. This production was brought about through an artificial price level which caused burlap to sell at about 25 cents per yard as compared with the prewar price of about 5 cents.

The United States now receives about 93 per cent of its supply of burlap from Calcutta, India. Calcutta produces about one-half of the world's consumption of jute fabrics and bags, which in recent years have been India's leading export. In 1921, exports of Indian burlap and jute bags amounted to 829,000 tons valued at $171,291,000. Such shipments made up 22 per cent of the value of all Indian merchandise shipped overseas in 1921, and about 60 per cent of exports of articles wholly or mainly manufactured.

Calcutta owes her dominant position to her ability to manufacture burlap at a price so low that no country can compete except by means of a very high tariff. The average price per yard of burlap shipped from Calcutta to the United States before the war was about 2.75 cents and in 1920 about 4 cents. The production of raw jute is confined to India; the crop averages yearly about 8,000,000 bales of 400 pounds each. This monopoly of the raw material, close proximity of centers of production to centers of manufacture, and low labor costs are India's leading advantages. A comparison of wages paid in American bagging mills with those in Indian jute mills, shows for instance that in January, 1921, a weaver in an American mill received $19.50 per week, as against $2.84 paid to the weaver in an Indian mill. Indian labor is, however, relatively inefficient, but the employment of Scotch overseers and the use of up-to-date machinery minimize somewhat this handicap. A number of mills generate their own electric power. As a result the jute industry is maintained at a level of efficiency that is high for India.

Information is also given as to the uses of the various types of jute cloth, the scope of the domestic trade in each type, and the condition under which a domestic burlap industry could be fostered. Charts show the prices of Calcutta burlap since 1890, the rapid growth of the Indian industry in the same time, and how it has forged ahead while the jute manufacturing industries in other countries have been barely able to hold their own.

Copies of this publication may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy.

Hine Brothers, dealers in aniline colors and agents of the Cooks Falls Dye Works, moved on May 1 from 80 Maiden Lane, New York, to 5 Cedar Street. The members of the firm are William and Arthur Hine.

Springdale Finishing Company, Canton, Mass., has been incorporated with capital of $1,000,000 by George E. Sinkinson, president; Harry A. King, treasurer; Charles H. Gelpke, clerk; Frederick Apintig, Jr., director.

ORGANIZE TO GIVE SCIENTIFIC SERVICE TO MANUFACTURERS

Organizations of business men are wont to establish a variety of services designed to the profit of the members of the group—legal, taxation, insurance, accounting, banking and freight are subjects usually receiving special consideration, says the "Journal of Industrial and Engineering Chemistry." But it has remained for the Associated Industries of Massachusetts to establish a technical information service for its members. This is a forward step of direct interest to chemists and establishes a precedent which should assist chemists in other localities in bringing home to manufacturers a realization that in applied science they have a reliable anchor to windward.

New England has been a favorite place for such activities, because of its relatively small area, the concentration of its diversified manufacturing, and the agencies at work. The several colleges and universities and technical schools have been active centers, aided by several commercial laboratories. When one chemist does a really good piece of work, all chemists and the science are directly benefited. If the work is poor, all suffer. We quote from the Association's announcement:

"The service is equipped to answer inquiries on the fundamental processes employed in manufacturing operations, such as steam generation, water softening, lubrication, heating, drying of materials, filtration, distillation, evaporation, dyeing, etc., and to supply members with knowledge which will be of material aid in solving problems of construction, the properties of building materials, the selection of the more important types of equipment for certain operations, the erection of machinery, and the like. It is also in a position to direct members to sources of information on technical subjects and to places where materials or equipment can be obtained to the best advantage."

This is an encouraging sign which should be brought to the attention of business organizations everywhere.

JOHN CAMPBELL & CO. ANNOUNCE "CAMELITE" FOR STRIPPING COTTON, WOOL AND SILK

John Campbell & Co., 75 Hudson Street, New York City, announce having added to their manufacturing program a very important auxiliary to dyestuffs, which they market under the name of "Camelite."

This is a stripping preparation for cotton, wool and silk, which has heretofore been sold under many designations such as Hyraldite Z, Decroline, and others. Camelite, according to the announcement, offers the best means for stripping dyed fabrics. It is an indispensable product for every dyer, particularly shoddy, worsted and woolen dyers, cotton dyers, and garment dyers. It is positive in its action and offers many advantages over other methods of stripping; for instance, Chrome and Sulphuric or Oxalic Acid, as the fibers are left in much better condition.

Most all of the coal-tar range of dyestuffs are stripped to light grounds with Camelite. The standard method of stripping is as follows but this may be modified to suit the user's most particular needs:

In a lukewarm bath at a temperature of 105 to 120 deg. Fahr.
Add 2 to 4 per cent Camelite (Dry Form) and
2 to 5 per cent of Formic Acid 85 per cent, or, if preferred,
1 to 2 per cent Sulphuric Acid 168 Tw.
Enter the goods, raise in about one-half hour to boil.
Boil for 20 to 30 minutes, then rinse in a cold to lukewarm bath very thoroughly, after which the goods are ready for redyeing.

Camelite, it is stated, is not to be confused with the ordinary forms of Hydrosulphite of Soda, as Camelite is prepared for the one purpose, viz. stripping of dyed materials. This product is shipped in a powder form in airtight containers.

The company offers the services of its Coloristic Laboratory in assisting dyers to obtain their shades, and announces that if consumers have any material on hand which is not in a salable condition, it will, providing a sufficient sample of the yarn or fabric is sent, strip the material and redye it to a marketable shade.

PLAN "MAKE IT OF RIBBON" CONTEST TO STIMULATE DEMAND

A nation-wide "Make It of Ribbon" contest is planned by the ribbon manufacturers of the United States in order to increase the consumption by stimulating the demand for ribbons. Meetings, to which all ribbon manufacturers were invited, have been held in the rooms of The Silk Association of America and a definite promotive campaign is about to be announced.

An intensive publicity campaign through media of proved effectiveness is under consideration and a country-wide contest carrying a series of prizes for the best idea worked out in the various widths of ribbons.

Announcement of the plan will be made to the whole ribbon-handling fraternity—manufacturers, salesmen, jobbers, specialty houses, retailers, buyers and heads of stock—within the next few weeks in order that the fall season may benefit from the effects of the campaign.

The ribbon industry represents an investment of approximately $20,000,000 in machinery and loomage capable of turning out approximately $60,000,000 in merchandise. In the opinion of the manufacturers, this investment is at the present time at the mercy of chance, because it is not safeguarded by any co-operative policy of merchandising. The product is also at the mercy of chance because it is crowded upon a market which may or may not be ready to absorb it.

As one manufacturer has stated, "The ribbon manufacturers plant twice a year, but never plow their field."

The temporary committee on plan and procedure which has been appointed to formulate plans is headed by Ernest C. Wettlaufer, of Wettlaufer Bros. Other members are: B. P. Bartlett, John C. Welwood Corporation; Benjamin Jacoby, Best & Jacoby; Andrew Kane, Taylor-Friedsam Company; Henry Zuber, Pelgram & Meyer; John B. Taylor, ex-officio, Phoenix Silk Manufacturing Company.

NEW COLOR OFFERINGS OF GRASSELLI CO.

The Grasselli Chemical Company is now offering a new wool color under the name of Cloth Red B Concentrated, which is chemically identical with the well-known formerly imported Cloth Reds manufactured by the Farbenfabriken of Elberfeld Company. The fastness to light and the fastness to fulling against white wool is very good. Cotton and silk are slightly tinted by a severe milling. The new product may be dyed on wool according to the acid, chrome mordant, afterchrome or monochrome processes. It is also useful in the dyeing of silk, as full rich shades of red are obtained.

The Grasselli Company has also placed on the market a new product under the name of Direct Rubine B, which is a direct dyeing cotton color similar in shade to the formerly imported Benzo Rubine H W. The new color gives a bright bordeaux shade on cotton. It should also prove of great interest as a union color, as it dyes cotton and wool the same shade.

READING TEXTILE MANUFACTURERS HELP COLLEGE FUND

Textile manufacturers of Reading, Pa., have contributed liberally to a fund of $350,000 to convert Schuylkill Seminary, North Reading, into a college with a permanent endowment. Of the amount needed, $240,000 has already been covered. George D. Horst, head of the Nolde & Horst Company, one of the trustees of the college, headed the list with a gift of $50,000. The Wyomissing Industries gave $25,000. Charles E. Leippe, of Reading Knitting Mills; E. Richard Meinig, of E. Richard Meinig Company, and S. D. Bausher, of Glorie Underwear Mill and Acorn Hosiery Mills, gave $5,000 each. Mr. Bausher, president of the National Association of Hosiery and Underwear Manufacturers, is serving as treasurer of the fund.

British patent No. 171,078, assigned to the Farbewerke vorm. Meister, Lucius & Bruening, is concerned with a method of making stable vat dye preparations by mixing alkali indigo white with alkali leuco compounds of quinone vat dyestuffs such as sulphurized arylido-halogen quinones, and evaporing the same to dryness in a vacuum. Materials such as molasses, or sulphite cellulose pitch may also be added.

NEW VIRGINIA-CAROLINA BOND ISSUES

Issues of $35,000,000 in bonds of the Virginia-Carolina Chemical Company have been underwritten by Wall Street bankers. One of the new issues is $22,500,000 first mortgage twenty-five year 7 per cent sinking fund gold bonds, due June 1, 1947, which will be offered at 98¾, to yield about 7.12 per cent. The other issue is of $12,500,000 fifteen year 7½ per cent convertible sinking fund gold bonds. The syndicate includes Blair & Co., Inc.; Hallgarten & Co., the Equitable Trust Company and the Chase Securities Corporation.

The new financing will provide for the purchase or retirement at or before maturity of all the company's existing funded obligations and will supply additional working capital. The total authorized amount of the first mortgage bonds is $35,000,000, of which it is proposed to issue at present $22,500,000. They are to be secured by a first mortgage on all the company's physical properties and will be further secured by the deposit of the entire $10,000,000 capital stock of the Southern Cotton Oil Company, and the stock of other subsidiaries.

George H. Perkins, consulting textile engineer and secretary of the Textile Division of the A. S. M. E., moved his offices on May 15 from 34 Batterymarch Street, Boston, to the Mason Building, 70 Kilby Street, Boston.

WANTED, COLORIST

Wanted by large manufacturer of dyestuffs, colorist who has had scientific training in dyestuff chemistry. Applicant should be familiar with the practical application of all kinds of dyestuffs and must be able to conduct all work necessary for the investigation of new colors. Address Box 211, American Dyestuff Reporter.

WANTED, LABORATORY MAN

Wanted by large dyestuff manufacturing concern, reliable man to take charge of routine work in dye laboratory. Applicant must be familiar with the dyeing and testing of all classes of dyestuffs, including vat colors. Man who has had practical dyeing experience is preferred Address Box 212, American Dyestuff Reporter.

Large manufacturer has good opportunity for dyestuff salesman who is well acquainted with woolen and worsted mills in Rhode Island and Connecticut. Reply to Box 213, American Dyestuff Reporter.